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LECTURE XXXIV.

THE FRONTAL BONES AND ANTLERS OF DEER.—THE FRONTALS OF SWINE AND DOGS, AND THE TEMPORAL, PARIETAL, OCCIPITAL, ETHMOID, AND SPHENOID BONES OF HORSES, CATTLE, SHEEP, SWINE, AND DOGS.

The Frontal Bones of the Deer.—Were I a phrenologist I should probably detain you a little while by a description of the beautifully irregular surface of the external plate of the frontal bones in our occasional patient, the deer; covering in him a considerable portion of the brain; and, from the almost total absence of the frontal sinuses, or those diminutive cells, being confined to the orbitar plate and process alone, actually corresponding with the irregularities on the surface of the brain. I will content myself, however, with simply pointing out the extension of the frontal bones down the face; their suture with the nasals; the extraordinarily involved suture between the frontals; beginning below, with a mere approximation of parts, where the nasal cavities alone are found: a dove-tailed union commencing as soon as this bone begins to cover the brain; and increasing in complexity and in strength, and the bones thickening and elevating themselves into a considerable crest or ridge as we proceed backward, until we arrive at the parietals, where the intricacy of the union would baffle all human skill to copy. Compare these heads of the sheep and the deer;—the head and the horns are the weapons of offence;—see the different form of the cranial covering in these two animals, and how the brain is preserved in the one by being lowered out of the way of danger, and in the other, by this ridge of bone and wonderful complexity of suture. These are illustrations of design which should not escape us. To these I may add, the long and wide, and deep, and polished sulcus connected with the foramen supra orbitarium, and the projection and turning up of the superciliary ridge to deepen and to protect this sulcus, while it gives prominency and expression to the eye. The depression across the frontal bones, resembling in situation and character that across the nasal bones of the blood-horse, indicating the degree of breeding, and sometimes a wild and unsubdued temper, should not be overlooked; but that which principally deserves attention, is the different construction of the horn or antler.

The Antlers. The First Tubercle.—With the exception of the rein-deer, they are confined to the males. The female rein-deer have smaller antlers than the males. At birth there is little difference between the crania of the male and female fawn; but at six months old a small protuberance marks the place of the future antler. It grows, but does not exceed a few inches in length, and assumes a cylindrical form, covered by a prolongation of the skin. It consists of a short solid process of the frontal bone, bearing on its summit a tubercle composed of a substance resembling that of the antler of the adult animal, and which is a singular compound of horny and bony matter; solid, and even denser and harder than bone. The skin covering the tip of this cylindrical body at length gives way to its pressure, and a diminutive horn appears.

The Second Antler.—After the cuticle has peeled off, the tubercle remains stationary for several months. The constitution then begins to prepare for the annual œstrum, or desire to perpetuate the species. The testicles of the fawn begin to appear, and those of the adult animal which had shrunk when the period of œstrum had passed, again enlarge; the vital current flows with increased rapidity and volume through the frame. There is a mysterious sympathy

between the antler, the badge or designation of the sex, and the development of the generative organs; and the external carotid, by branches from which the frontals are supplied, increases in size, and more blood is determined to this part. It cannot, however, be employed in the nutrition and growth of the antler, for the vehicle which contained the ramifications of the artery, the skin or periosteum of the antler, is gone. Nature, however, finds out a way to accomplish her purpose: a kind of inflammation is set up at the line of demarcation between the antler and its bony base; a reddish ring is observed at the base of the antler, and surrounding it; it may be plainly enough seen in the adult, and traced with very little difficulty in the fawn. The inflammation runs its course, and the process of exfoliation is accomplished. As the dead bone is thrown off from the living beneath it, so this tubercle, or the full-grown antler, is detached from the long process of the frontal. This shedding or *moving* of the horn takes place in the adult animal in the latter end of February or March—he has enormous antlers to complete before he meets his mate: the tubercle of the fawn remains until May.

The Reproduction of the Antler.—A sore is now left on the summit of the bony pedestal or base, from which hemorrhage sometimes takes place for two or three days; but at length it skins over, and a pellicle or prolongation of the surrounding integument perfectly covers it. I have spoken, however, of the enlarged caliber of the carotid, and more than the usual quantity of blood which pours on in this direction, and must be employed. First, there appears to be a bony secretion; an irregular bony ring, a burr, forms around the summit of the frontal process; and from its centre a tumour springs, and gradually enlarges and becomes covered with a prolongation of the integument, through and over which and passing within the bony ring, thousands of blood-vessels ramify to produce and to nourish the future antler. The roughened and furrowed surface of the antler sufficiently proves how numerous and how large these vessels have been. This tumour grows and takes upon itself the precise form of the antler that is to be—it is the antler in miniature. At first it is soft—it is filled with a gelatinous fluid; but the usual process of ossification takes place, and this gelatine speedily gives place to a cartilaginous substance. The antler grows and attains nearly its destined bulk; when it becomes still harder: and the cartilage yields in its turn to a compound of horn and bone, without the elasticity of the former, and with more than the density and strength of the latter. This hardening process commences at the base, and spreads upward, the antler above continuing to grow while any portion of it remains cartilaginous. At first the antler grows with strange rapidity—there is nothing in the animal frame that can be compared with it. Antlers weighing 28 or 30lbs. are completely formed in little more than two months; and I have been told, that the horns of some of the Wapiti deer in the Zoological gardens have increased in length more than an inch daily.

Separation of the Integument.—While this process of hardening is going *forward*, the vessels are necessarily compressed, and diminished in caliber. They are particularly and most speedily so within the burr or ring at the base, and they become at length obliterated there; and all nourishment is cut off from the covering of the antler, and from the antler itself. The cuticle, deprived of nourishment, soon dies—it peels off—it hangs in strips and rags about the antler, and the animal annoyed by it rubs it off against everything within its reach. The antler, having once become solid, remains unchanged notwithstanding the deprivation of nutriment, and continues its allotted time upon the forehead, and when in due time it is detached from its base, it is more enduring even than bone itself. This seems to be a painful process to the animal—the growing antler is exceedingly tender. We may well imagine this when we consider the vascularity of the membrane by which it is covered; the stag accordingly retreats into the thickest coverts, and conceals himself as much as he can, until he once more has his branching honours full upon him.

The Age of the Stag as indicated by the Antlers.—The antler of the first year is a mere tubercle; the second year produces a simple, straight-pointed horn; in the third year the branches begin to appear,—two and sometimes three of them. The usual indication of the age by the number of branches is a very uncertain one. The stag of six years old has generally ten or more branches of different sizes; and, after that, the age is guessed at by the size of these branches, as well as the more *palmated* and *crowned* appearance of them: while the antler increases every year even to very old age. Of that age there are some strange stories told. The stag was said to live for a century or more, and we have an account of one that was taken by Charles VI. in the forest of Senlis, with a collar round his neck bearing this inscription, "Cæsar hoc mihi donavit." Many who were fond of the marvellous at once concluded that this stag was probably a thousand years old, and that the collar had been given by a Roman emperor; forgetting that he might have migrated from Germany, the emperors of which assume the name of Cæsar. The average age is eighteen or twenty years,

although some have been undeniably proved to be at least thirty-five years old.

Connexion of the Antler with the Generative System.—In every animal whether wearing antlers or horns, we trace a mysterious connexion between their development and the function of generation. The branching horn of the ox and the stinted horn of the sheep are proofs of this; but it is more evident in the ruminants with antlers. The process of the casting of the antler commences when the period of œstrum or rutting is approaching, and the testicles are beginning to be developed. During the growth of the horn they enlarge, and when the antler is perfect the stag is prepared to perpetuate his species. If he is castrated during the growth of the antler it falls off, and a little while afterwards a smaller and comparatively insignificant one appears, which is not afterwards shed, and which does not perfectly harden.

Use of the Antlers.—If I am asked why there is this wonderful provision for these immense bodies of so short a continuance, (for they are not perfect until August, and they are shed in March,) it will be sufficient to reply, that they are highly ornamental to the animal, and that we have found a method of converting them to numerous useful purposes. There are many things which we could spare better than the horns of the stag.

THE FRONTAL BONES OF THE SWINE.

These are of a shield-like form, and as flat as those of the sheep are convex; yet the frontal sinuses are much larger than in the polled sheep, and scarcely less than those in the sheep with horns. They occupy the whole of the parietal and temporal bones as well as the frontals, and reach, as in the ox, even as far as the condyles of the occipital bone. The cells are more symmetrically arranged than in the sheep or the ox; there are seven or eight distinct rows of them. The use of this is not manifest. Do they contribute to the piercing shrillness of his cry? or to that acuteness of scent which is necessary to enable him to discover his food, sometimes buried in the earth, or at others surrounded by a strange compound of villanous smells?

You will observe in this animal the peculiar strength of suture by which the frontals are united to the nasals, in order to enable him to dig and burrow for his food—the deep channel for the security of the vessels from the foramen supra orbitarium—the situation of that foramen, falsely called supra orbitarium here, for it is even below the orbit—the downward direction of the channel to guide the vessels to the prolonged inferior portion of the face, while the forehead is supplied principally from the temporals—but more particularly you will observe the difference in the orbitar process.

The Peculiarity of the Orbitar Process in Omnivorous and Carnivorous Animals.—This process, instead of being prolonged to meet either the zygomatic arch, as in the horse, or the bifurcation of the malar bone as in the ox and sheep, is merely a short and insignificant tubercle, and the orbit is completed by the interposition of cartilage. This deficiency in the outer part of the margin of the orbit forms, with very few exceptions, and these principally the bimana and quadrumana, a plain distinction in comparative anatomy between the herbivorous, omnivorous, and carnivorous animals. In the one, the bony margin in the front of the orbit is complete; in the others, a portion is supplied by cartilage. The reason of this is evident. This process of the frontal bone is a kind of boundary to the temporal fossa, in which the coracoid process of the lower jaw plays, and around which the temporal muscle (that which is chiefly concerned in mastication) is wrapped. The herbivorous animal has no occasion for any very extensive play of this bone or violent action of the muscle; and additional security may be given to the eye by making its external margin completely bony. The food is easily grasped, and the teeth are not the usual or chief weapons of offence. It is different, however, with the omnivorous and carnivorous animals, who require extensive play of the bone and violent action of the muscle in order to enable them to grasp their prey, or contend with their foes. The complete bony margin of the eye would limit them too much, and the yielding, elastic cartilage is interposed, to give the requisite room.

THE FRONTAL BONES OF THE DOG.

On these I will not detain you. They are also of a shield-like form. There is a peculiar longitudinal depression commencing at the parietal ridge, and running down to the extremity of the nasals. The situation of the frontal sinuses is marked by distinct protuberances, and there are no supra-orbitar foramina. The orbitar processes are also shorter and the interposed cartilage proportionably longer than in the hog, because this is a carnivorous animal; and for our service, as well as in his natural state, he requires more powerful action of the temporal muscles, and more extensive play of the coracoid process of the lower jaw.

Of the other bones of the cranium my account will be exceedingly brief, for they admit of little physiological and less pathological illustration.

THE PARIETAL BONES.

The Horse.—Above the frontal bones are the parietals. If I were speaking of the adult animal I should say the parietal, for although these bones are distinct from each other in the fœtus and the colt, all trace of suture is lost before the horse is three years old; and nothing remains but a kind of ridge which they both contribute to form. They are surrounded by the frontals, the temporals, and the occipital. They are united to the first anteriorly by the coronal suture; to the second inferiorly by the squamous; and to the last posteriorly and superiorly by the lambdoidal; but the lambdoidal is generally obliterated in the adult horse. They cover the middle portion of the brain, and constitute the centre of the roof of the cranium.

The texture of the parietals is considerably closer and harder than that of the frontals, for they take a more important share in the defence of the brain. Their diploe is exceedingly small, and the external and internal plates are in a manner agglutinated together, except in old horses, in which, as I have observed in a former lecture, the frontal sinuses reach to the occiput.

They are completely covered by the temporal muscle on each side, which I have just spoken of, as the main agent in mastication, and which, not only arising from the whole of their convex surface, but from the anterior portion of the occipital, from the squamous portion of the temporal, from the base of the zygomatic arch, and even from a portion of the frontal, possesses immense strength. It suddenly narrows, and, taking a curved direction, winds itself round the coracoid process of the lower jaw, in order to move which it needed to be immensely strong, for it acts with enormous mechanical disadvantage. This, however, belongs to the digestive system.

This origin from the whole of the convex surface of the parietal bones is given to the temporal muscle for another important purpose, viz. more effectually to preserve the brain from injury. It is the part of the cranium most exposed to injury, and it covers the greater part of the brain. The horse has no hands to ward off many a danger, and this muscle is placed here, by its softness and elasticity, to neutralize almost any violence that could be offered. There is but one line of bone uncovered, and that is the thick ridge of the parietals, prominent both above and below; on each side is a dense massy muscle offering that securest of all defences, a gradually-yielding resistance; it is the hand receding and stopping without injury or the slightest shock, the cricket-ball hurled or driven with the greatest force,—it is the pillow of feathers, the very cover of which a pistol-ball cannot penetrate,—or the wool-pack hung over the ship or the wall, and from which the cannon-ball falls harmless. The parietal of the human being is undefended, the whole of the cranial roof is exposed; but nature has here given a secure protection to him who has neither hands nor intelligence to ward off the blow.

On the internal plate of the skull there is no suture between the parietals, but there is a ridge-like projection corresponding with that on the external plate. Along the centre of this ridge runs a groove for the reception of the longitudinal sinus. Posteriorly is a triangular bony process, forming a portion of the bony tentorium, peculiar to the horse and the dog; while the transverse grooves for the reception of the lateral sinuses are sufficiently evident.

In Cattle.—The parietal bone in cattle is a very different one from that which I have just described. It is but one bone. Here is the head of a fœtal calf, and not the vestige of a suture can be traced on the parietal; in a very early stage, however, of fœtal existence there are two parietals. Not the smallest portion of it appears on the superior part of the head, except at what we should term the occipital crest in the horse. That ridge or crest is formed in cattle by the union of the frontal and parietal bones. Below this ridge it extends down almost to the foramen magnum, occupying the place of the occipital bone, and giving insertion to the muscles attached to that bone in the horse, and also to the ligament of the neck, and hollowed by cells to its very extremity. When it approaches the root of the horn it suddenly narrows, it becomes a mere band between the occipital and temporal, and the frontal bones; arriving in the temporal fossa it spreads under the horn, contributes to give it some support, and unites with the frontal by a denticulated and squamous suture. It then suddenly narrows, and is lost in a process between the frontal and the temporal.

In Sheep.—In the sheep it has the same relative position as in the horse, placed anteriorly to the occipital ridge, and between the frontal and occipital bones; but as there is no muscular covering here, it is depressed perfectly out of the reach of danger. The lower and temporal portion of it is alone covered by muscle.

In the Hog.—The parietal in swine is a singularly-shaped bone, occupying but a little portion of the cranial roof, and presenting as many angles as the shield of any templar or crusader. If that portion which enters in to the construction of the roof of the cranium is flat and devoid of muscular covering, the symmetrical ar-

rangement of arched cells beneath gives it sufficient strength.

In the Dog.—The parietal bones in this animal form almost the whole of the roof and sides of the cranium, and are even more deeply covered by the temporal muscle than the parietals of the horse. The consequence of this is that the brain of the dog is securely defended, and it is almost impossible to destroy him by knocking him on the head.

The different Form of the Parietals in the Dog.—M. F. Cuvier has endeavoured to arrange the varieties of dogs into three groups, two of them principally depending on the form of the parietals, either insensibly approaching each other so as to contract the cerebral cavity, or swelling out and becoming rounded, so as to enlarge the hollow of the skull. The third variety is characterized by the high frontal and extensive sinuses, and diminished cranial cavity. Among the first are the wild dogs, whether the East Indian, or the North or South American, the Albanian, the Dalmatian, and all the varieties of the greyhound; all of them possessed of comparatively little intelligence. Among the second are the most useful and intelligent of the canine species, the spaniel, the terrier, the hound, the poodle, the Siberian, and above all the Newfoundland, the Alpine, and the shepherd's dog. To the third belong the pug, bull-dog, and mastiff.

M. F. Cuvier's Arrangement erroneous.—I never could satisfy myself of the propriety of this arrangement. I have now before me the cranium of a greyhound with the parietals decidedly rounded and expanded, and that of a Newfoundland-dog with the same bones narrowing superiorly and ridge-formed to a degree that almost staggers my faith in the connexion between a capacious cranium and superior intelligence. The fact is, the form of the parietals depends simply upon the size of the dog. The small spaniel and the terrier have the parietals rounded so as to form almost a semicircle. There is scarcely the vestige of a ridge. The skull is polished and smooth, and the temporal muscle is spread thinly over the whole. They want no great power of muscle to seize their diminutive prey, or to defend themselves from their ordinary enemies. Even the vermin-terrier has this rounded cranium. But the terrier and the spaniel of larger size, and destined for other purposes, needs, occasionally at least, greater strength of jaw; and then the parietals are roughened, and there arises from this centre, formed by them and by a process of the occipital bone, a considerable ridge to give a firmer and tendinous attachment to the temporal muscle; and that this ridge may be firmly based, the sides of the parietals lose their rounded form and assume a slanting direction, and the cranial cavity and the quantity of brain are to a certain degree diminished, *at least superiorly*. Hence the difference in the form of the parietal, depending not so much in the breed as on the size of the dog. One thing, however, is observable, that while the thickness of the ridge in the centre and the yielding resistance of the muscle on each side defend the skull not only from ordinary, but unusual violence, the want of the ridge, and the thinner expansion of muscle on the crown of the skull in the smaller dog, are compensated by a very curious extra plate of bone, which sometimes extends a considerable distance on either side of the parietal suture.

THE TEMPORAL BONES.

In the Horse.—There is a temporal bone on each side at the lower part of the wall of the arch, and each may be divided into three portions:—The *Petrous*, or hard, stony portion, incloses the mechanism of the ear, and is considerably developed within the cranial cavity. I shall speak of this when treating of the auditory system. The *Tympanal* portion, evidently distinct in the horse and the dog, and the prolongation of which forms the external bony meatus, while the internal is expanded into several distinct cells. And lastly, the *Squamous*, forming the base of the zygomatic arch, and overlapping the parietal bone in the form of a shell. It contributes only in a slight degree to the construction of the cranial cavity. That portion of it which helps to make the zygomatic arch, and also contains the glenoid cavity, into which the condyloid process of the lower jaw is received, and constituting the joint of the lower jaw, belongs to the digestive system, and all that we are here concerned with is the squamous or overlapping portion placed as a buttress at the base of the cranial arch to give it strength;—the kind of union best adapted in this situation to neutralise the lateral pressure, and to prevent the base of the arch from spurring out, when there is pressure or concussion on the crown.

In Cattle.—There is a remarkable variation in the glenoid cavity in cattle, conformable to the different mode of mastication, or, rather, to the process of remastication; and from the different situation of the parietal, no longer the wall of the arch, but a mere band, deep in the temporal fossa, and having no stress upon it, the *squamous* suture was not wanted, and is not found; it is only in a slight degree *dovetailed*.

In the Sheep, Hog, and Dog.—The squamous suture is found in each of these animals; because, from the form of the cra-

nium, strength is required at the base of the arch, but in none of them is this portion of the bone at all developed in the cranial cavity. It does not enter into it in the least degree in the sheep.

The Ossa Triquetra.—In the horse, the sheep, and more indistinctly in the dog, there is a singularly elongated, yet somewhat triangular, bone interposed on each side between the squamous portion of the temporal and the occipital bone, and attached at first by suture, and afterwards by bony union to the petrous portion of the temporal bone—the *os triquetrum*, or *three-sided bone*. It reaches from the base of the occipital crest to the petrous portion of the temporal. It seems to fill up a sort of hiatus or gap between those bones. Of its use I will not pretend to speak, but Carus is wrong when he traces the bony tentorium of the horse and dog from the *ossa triquetra*. It is evidently derived from the parietals, and from both the petrous and squamous portions of the temporal. There is a deep sulcus or channel about the centre of this bone, in which runs the occipital artery in its way to the cranium.

THE OCCIPITAL BONE.

In the Horse.—This bone occupies the same relative situation in the human being and the quadruped, although there is much apparent difference in its position. A consideration of the attachment of the head to the neck in the one and the other will explain every difficulty. In the foal it is composed of four portions, the crest or tuberosity, the condyloid processes on either side, and the basilar portion or base of the bone. The crest or tuberosity is arch-shaped—it is concave anteriorly, and convex posteriorly, and in this form offering the greatest possible resistance to injury, and protection to the cerebellum. It gives origin to the complexus. The continuation of the crest descending towards the styloid process on either side, gives attachment to the obliquus capitis superior. Below, and in the centre, is a spinous process—some call it a tuberosity—to which is attached the curiously elastic cervical ligament. On each side is a broad roughened surface, whence spring the recti postici muscles; and below is the foramen magnum, through which the spinal chord and the sub-occipital nerves escape from the cranial cavity and the vertebral arteries, and the accessory nerves enter into it. Still lower, and taking a direction anteriorly, is a solid projection of bone termed the basilar (leading to the brain the noblest, or *king* among the organs), or, from its shape, the cuneiform, wedge-like process; it is the posterior termination of the floor, or, rather, it is the base of the cranial cavity or arch. It is solid, to give strength to the arch, and to break and stop every vibration or concussion that may be communicated to it. In this it is assisted by the sphenoid bone, the posterior and solid part of which early becomes inseparably united with this portion of the occipital bone, and so makes one continued solid base along the whole of the greater part of the cranium. On either side of the foramen magnum is a beak-like prolongation termed the coracoid or styloid process of the occipital bone. It is peculiar to animals whose heads are set on in a slanting direction. It gives attachment to the obliquus capitis anticus. Between these and the condyles are the condyloid notches or fossæ, and immediately anterior to the condyles are the foramina through which the lingual nerves escape.

In Cattle.—I have anticipated the main difference in this bone in cattle when describing the parietals; there is no crest or tuberosity. The condyles are not so much developed, and the styloid processes are smaller and curved. The basilar process is somewhat increased in breadth and more tuberculous, but much diminished in length, and there are two condyloid foramina, the one placed externally and the other internally.

In Sheep.—There is here an occipital ridge, but it is depressed far in the poll, and presents a very irregular projection, with a direction posteriorly and downwards. The styloid processes are less curved, and the basilar process yet more compressed, broad, and short, with a peculiar irregularity of surface for the insertion of the flexor muscles of the head. You have observed the nodding motion of the sheep as he crops the herbage. These had begun to appear in the suture between the occipital and sphenoid bones in the ox. There are likewise two condyloid foramina.

In the Hog.—The ridge of the occipital bone is bold and prominent, and forms a not unpleasing termination to the cranium superiorly and posteriorly. The symmetry of the parts would scarcely be suspected in the clumsy head of the living animal. The ridge presents a reverse form to that of the horse; the concave surface is placed posteriorly, and the expanse of the bone beneath the crest is considerable and perfectly smooth. The cervical ligament does not reach to the occipital bone here, and the hog has no occasion for any extraordinary strength in the muscles of the neck. The styloid processes are long, slender, and straight, and the condyloid foramina, of which there are two, are close to the base of it. The cuneiform process is short, thin, and weak.

In the Dog.—Nothing can be so different as the occipital bone in the small and large dog—in him, whose prey is diminutive, and the other who has occasionally to contend with noble antagonists. A ridge of the occipital bone is received between the posterior edges of the parietals, and is bold or insignificant, according to the destiny of the dog. The cervical ligament reaches here no farther than the dentata; but in the large dog the posterior surface of the occipital is roughened to a degree scarcely credible, for the insertion of the muscles of the neck, so powerful in this animal: there is nothing in the horse or the ox comparable to it; and there is no animal who makes so much use of the cervical muscles in shaking or worrying his foe or his prey. This surface is also unusually broad in the more powerful dogs, and the cranium is correspondingly so. There is no false projection of the temporal bone, as in every other domesticated quadruped. The width of the lower part of this occipital surface is the actual width of the cranial cavity, and thus compensation is made for the slanting direction of the parietals, and the comparative narrowness of the skull superiorly and anteriorly. When I thus examine it, I find sufficient cranial capacity and bulk of brain in my favourite Newfoundland and Alpine and shepherd's dog. The styloid processes are short, and the condyloid foramina double.

THE SPHENOID BONE.

Of the singularly-formed sphenoid bone I shall say but little. Its body is early consolidated with the basilar process of the occipital for the sake of strength, while the union between it and the anterior portion is often exceedingly slight. The body of the bone is convex and smooth inferiorly, and irregularly concave superiorly and anteriorly: on the centre of it lies the pituitary gland. From the sides of the body there extend two broad and thin bony plates, which are termed the wings. The termination of them is seen in the posterior part of the orbit; and within the cranial cavity they support the middle lobes of the brain. From the base of these wings there are two processes or legs; they skirt the æthmoid bones, unite with the palatine, and afford attachment to the internal pterigoid muscles. The anterior part of the body of the bone is hollowed into cells in the horse, but which are not found in the ox. The sphenoid bone is small in that animal. In cattle the cuneiform process is deeper and less visible, and the pterigoid processes longer; and there is a very considerable difference in the arrangement of the foramina through which the nerves proceed from the brain, and the arteries enter into it, and which will be noticed when we describe the course of the nerves. The external pterigoid process in the dog presents a curious loop, round which the tendon of the circumflexus muscle plays as over a pulley.

THE ÆTHMOID BONE.

The crista galli, cribriform plate, and nasal development of this bone, have been described when treating of the contents of the nasal cavity. The body of the bone is situated at the base of the skull, anteriorly to the sphenoid bone. It is hollow, and forms two cavities, called the æthmoidal sinuses, which are divided by a broad perpendicular plate; and two thin expansions of bone proceed from the sides, which are termed the wings. They spread outwards and upwards, forming the posterior and inner parts of the orbit, where from their smoothness they are called the ossa plana—their other surface forms a part of the cranial cavity, and supports the anterior lobes of the brain.

THE CRANIAL CAVITY.

All the bones, with the exception in the sheep of the squamous portion of temporal, can be easily traced in the inner plate of the cranium; the frontal, parietal, and occipital superiorly; the parietal and temporal laterally; the occipital posteriorly; the occipital, sphenoid, and æthmoid inferiorly; and the æthmoid and frontal anteriorly. There are, however, no dovetailed or intricate sutures, but the plates lie in approximation to each other; they are harder and more glassy and elastic, and by the union of these substances of evidently different structure, every vibration or concussion which might have spread within the outer plate is diminished and *damped*, if not destroyed; or that which remains is spread by the inner elastic plate over the whole of the cavity, and rendered perfectly harmless by this distantion.

The longitudinal Falx and bony Tentorium.—The cavity is divided into two parts, longitudinally and transversely. Of the longitudinal division, commencing from the crista galli of the æthmoid bone, curving forward and upwards along the frontal and parietal until we reach the tentorium, forming a thickened ridge of bone for the greater security of the central arch, grooved for the longitudinal sinus, and affording attachment to the duplicature of dura mater, and dipping between and separating the lobes of the brain, I have already spoken, when describing the bones of the skull. Posteriorly and transversely there commences a more perfect bony separation. From the centre of the roof, and at the suture between the parietal and the occipital bones, evidently

belonging to the parietal, and not to the occipital, as our anatomists describe it, nor to the ossa triquetra, as asserted by Carus; an irregular plate of bone descends, forming a complete division between the anterior and posterior portions of the cranium. As it dips downward, it is joined by a similar projecting plate from each petrous portion of the temporal bone, and these unite to form a curious bony curtain, which, with a duplicature of the dura mater dipping down from it, divides the cerebrum from the cerebellum, merely leaving sufficient opening for the crura cerebri to pass underneath. This bony separation is evidently designed to keep these important divisions of the brain in their proper situation, and to prevent their pressing upon and injuring each other in the various motions of the head; but why they should be found in the horse and the dog and not in other animals of rapid motion, and where the brain is subject to equal concussion and injury, it is difficult to explain Is it that these animals are peculiarly our servants, and their speed and other powers taxed not only for our pleasure, but for various important purposes of commerce, of health, and even of life itself, and that this extra security was given to their brain that they might not fail us when their services were most required?

CASE OF

DELIRIUM TREMENS.

By JAMES S. WHITAKER, *Esq., F.L.S., &c.*

A case of this kind in a supervisor of excise lately came under my care. The symptoms of the disease are well known, and therefore I shall not say more on that head than that the man laboured under them in a very severe and determined form. All I wish is to make two or three short observations upon certain points in the treatment of this troublesome complaint, which the present case suggests to me more strongly than any that I have for some time seen. When I first saw my patient he was remarkably wild and violent, and I immediately gave him *three grains* of solid opium in a pill. Three hours afterwards he was no better, and he then took five grains of opium, with directions to repeat the dose every four hours until more quiet and comfortable. During the two following days he remained the same, as violent as ever, and never once closing his eyes in sleep; the whole of this time the opium was continued. In the evening of the third day I thought it time to increase the dose still more, and accordingly ten grains were given. An hour after this he became more tranquil, and during the early part of the night slept four hours, awaking more sensible and collected. The opium was now diminished to three grains. On the fourth day he had eight hours sleep, and appeared afterwards nearly as well as usual. From first to last this patient took *two drachms and one scruple of solid opium*, and yet neither the pupils nor the pulse were affected; the bowels were not constipated; nor was there any effect produced whereby it could be seen that a single grain of opium had been given, until the moment that he began to mend; and even then the anodyne, narcotic, and binding effects, were not more than would have happened from one grain under ordinary circumstances. It is therefore manifest, that though the large doses of opium had been given without *any* apparent result *at the time*, yet when an effect was produced it was not cumulative—that is, it was not a combined result of the various quantities that had been given, but a simple effect of the *ultimate dose*. I have always noticed this; but without offering any physiological argument upon it here as it would take up too much room, I shall merely deduce the conclusions—first of that a precise quantity of opium, varying in each individual case according to constitution, temperament, and so on, is required to saturate (if I may so speak) the natural stimulus of the disease.

2ndly. The absurdity of the fear which many entertain of repeating the opium only in increasing doses, for, as I have shown, no effect is produced unless a certain quantity is given, and this quantity acts *irrespective of all former doses*. There is no cumulative effect. I am so persuaded of this, that I should have no hesitation in enlarging the opium to *a drachm* in any case if no relief were obtained.

3rdly. The erroneous policy of recommending, as my late esteemed friend Dr. Armstrong did, and many others, that the opium should be discontinued, supposing it to be ineffectual within the first 48 hours. I admit that under their treatment, if relief be not obtained in that time it is seldom found afterwards, because the already small doses are still further diminished. I have proved, and I again repeat, that it is perfectly safe to give opium, regardless of quantity, until a decided effect is produced. To do otherwise than this, is to leave the patient to a precarious fate, to cast him upon the uncertain waters of chance, to lengthen out a terrible disease, under the possibility of being alleviated without a right pursuance of that remedy, whereby it might be so much more safely, effectually, and speedily removed. It is my intention to enlarge upon this disease at a future time.

225, Shoreditch, June 14, 1832.

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HISTORY AND TREATMENT OF THE MALIGNANT CHOLERA AT VIENNA.

SUPPLEMENTARY TABLES TO THE PAPER OF MR. FERGUS, PUBLISHED AT PAGE 353.

TABLE OF THE RELATIVE MORTALITY FROM MALIGNANT CHOLERA IN GALITZIA, AMONGST THE POLES AND GERMAN COLONISTS.*

PLACE.	Inhabitants.	Population.	Duration.	Taken ill in Population.	Dead in Population.	Dead to taken ill.
Flosrow	Poles	752	80 days.	1 in 9	1 in 25	3 in 8
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Kmazalnka ..	Poles	910	65	2 — 13	1 — 13	7 — 6
Nawoselica ..	German Colony	355	26	1 — 35	1 —177	1 — 4
Nawosyn....	Poles	419	49	1 — 9	1 — 23	1 — 2
Weldais	Poles, Jews, &c.	1021	68	1 — 13	1 — 35	1 — 2
[illegible]	Poles	207	47	1 — 7	1 — 29	1 — 3
[illegible]	[illegible]oles, &c.	356	56	1 — 11	1 — 59	1 — 4
[illegible]	[illegible], &c.	1227	62	2 — 19	1 — 14	1 — 2
[illegible]	.....	2708	114	2 — 19	1 — 33	2 — 5
[illegible]	[illegible] Colony	175	—	1 — 46	1 — 92	1 — 1

[illegible]man colony, two miles from Kmazalnka, there were only two [illegible]abylon, a large German suburb, had only one or two cases.

[illegible] DEATHS IN VIENNA, FROM 1805 TO 1831, INCLUSIVE.

	[illegible]portion to Year preceding.		Most Prevalent Diseases.			
	[illegible]More.	Less.	Nervous Fever.	Small Pox.	Diarrhœa, Dysentery, and Cholera.	Scarlatina.
[illegible]42	—	—	886	193	193	502
20,359	3617	—	2163	2330	367	147
1807 13,764	—	6595	776	54	340	71
1808 14,924	1160	—	592	12	—	—
1809 20,218	5294	—	1352	123	1382	—
1810 17,445	—	2773	1963	560	—	—
1811 15,359	—	2086	733	589	—	—
1812 14,407	—	952	624	145	—	—
1813 12,971	—	1436	784	254	513	—
1814 15,309	2338	—	1529	116	909	—
1815 11,520	—	3789	433	73	357	—
1816 12,306	786	—	390	57	242	—
1817 12,742	436	—	403	8	234	—
1818 11,070	—	1672	480	47	122	—
1819 11,501	431	—	466	100	90	—
1820 10,822	—	679	442	58	119	—
1821 10,411	—	411	375	176	94	—
1822 11,828	1417	—	371	238	552	56
1823 11,160	—	668	529	92	121	—
1824 10,537	—	623	376	8	101	—
1825 10,959	422	—	439	46	132	—
1826 12,190	1231	—	496	59	344	—
1827 12,363	173	—	502	59	124	—
1828 13,764	1401	—	532	342	106	—
1829 13,468	—	296	669	256	63	—
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* Given to Mr. Fergus by Dr. Flechner, Director of Quarantine at Podgorze.
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Pacskow	Poles	207	47	1 — 7	1 — 29	1 — 3
Solyn	Poles, &c.	356	36	1 — 11	1 — 59	1 — 4
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Bollchow....	Poles	2708	114	2 — 19	1 — 33	2 — 5
Engelsberg..	German Colony	175	—	1 — 46	1 — 92	1 — 1

In Debelawka, a German colony, two miles from Kmazalnka, there were only two cases; one died. New Babylon, a large German suburb, had only one or two cases.

GENERAL TABLE OF DEATHS IN VIENNA, FROM 1805 TO 1831, INCLUSIVE.

		Proportion to Year preceding.		Most Prevalent Diseases.			
Year.	Summary of Deaths.	More.	Less.	Nervous Fever.	Small Pox.	Diarrhœa, Dysentery, and Cholera.	Scarlatina.
1805	16,742	—	—	886	193	193	502
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* Given to Mr. Fergus by Dr. Fiechner, Director of Quarantine at Podgorze.
† Sanitary laws strongly enforced here.

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GENERAL TABLE OF THE MORTALITY IN VIENNA IN EACH MONTH OF 1831.

January	1135	July	1087
February	1179	August	1213
March	1393	September	2007
April	1363	October	2186
May	1301	November	1464
June	1257	December	1119

GENERAL PROPORTIONS OF DEAD IN 1830 AND 1831.

	Men.	Women.	Boys under 10.	Girls under 10.	Old People, from 90 to 100.
Died in 1830	4076	3633	3131	2868	30
1831	5240	5181	5327	5036	40‡
Increase in 1831	1164	1548	196	168	14

‡ One of these was aged 103, one 104, and one 108.

TABLE OF DISEASES TREATED IN THE GENERAL HOSPITAL, VIENNA,

From 12th of August till end of October 1831.

	Attacked.		Cured.		Died.		
	Men.	Women.	Men.	Women.	Men.	Women.	
Came with Cholera	98	134	43	55	50	66	
Fevers	22	47	9	12	13	35	Nervous, Gastric, Intermittent, &c.
Nervous Diseases	4	12	1	3	3	9	9 Convulsions; 3 Palsy; 3 Colic.
Inflammations	2	7	1	4	1	3	Pneumonitis & Peritonitis.
Skin Diseases	5	4	5	4	0	0	4 Itch; 2 Scarlatina; 1 Small-Pox; 2 Tenia.
Ex. & Secretion Diseases	25	14	6	5	9	9	10 Diarrhœa; 5 Hæmoptysis; 5 Gout; 6 Obstructions, &c.
Cachexies	26	26	9	9	17	17	12 Phthisis; 9 Dropsy; 8 Marasmus, &c.; Syphilis.
Insane	16	28	6	8	10	208	Of all kinds.
Surgical Diseases.	8	10	1	5	7	5	12 Chronic Ulcers, mostly scrofulous; 11 of these died.
Childbed and Preg.	—	30	—	20	—	10	
Puerperal Fever	—	4	—	1	—	3	
New Born	44	34	1	1	43	33	

			Cured.	Died.
Treated with ice from Sept. 15th, till the end of Oct.		100	65	35
Ditto	from end of Oct. till 12th of Dec.	42	34	8
Ditto	Stimulants, and hot frictions	292	128	164
Ditto	Ipecacuanha alone	21	9	12
Ditto	Ipecacuanha and stimulants	37	12	25
Ditto	Ice and stimulants	58	19	29

NOTES ON THE PRECEDING TABLE.

The cholera developed itself, in most part, during the course of the fever; in a very few cases, when the convalescence had commenced.

The intermittents were almost all tertians; the cholera broke out during the intermission, and did not prevent the occurrence of the succeeding paroxysm.

The cases of small-pox and scarlatina were in the last stage when attacked with cholera.

One who had the itch was taking sulphur.

The syphilis is no protection against cholera, in any form. Some patients had taken mercury up to the moment of being attacked with cholera.

Dropsies disappeared during, but returned eight or fourteen days after, the cessation of the cholera. However, in one case of hydrothorax the water disappeared, and did not return.

The cholera had no effect whatever on the state of mind of the insane.

Eight pregnant women brought forth dead children during the attack; three of them had living children during the recovery, two of which, however, died of the cholera. In seven the cæsarean section was made immediately after death, but always unsuccessfully.

In some the lochia stopped, but returned after the cholera; in others they continued to flow.

The secretion of milk was diminished in all. In some it ceased altogether, and did not again return.*

TABLE OF THE SICK TREATED IN THE CHOLERA HOSPITAL NO. 3 IN VIENNA,†

From September 18 till October 31, 1831.

Age.	Taken ill.		Cured.		Died.	
	Men.	Women.	Men.	Women.	Men.	Women.
From 10 to 20	14	10	7	8	6	2
20 to 30	20	26	12	19	8	7
30 to 40	13	16	6	7	7	7
40 to 50	14	12	6	8	7	4
50 to 60	7	11	2	2	5	8
60 to 70	6	6	3	0	2	6
70 to 80	1	3	0	0	1	3
80 to 90	0	1	0	0	0	1
	75	85	36	45	36	38
Total	160		80		74	

	Came.	Died.	Recovered.
On the 18th of September	26	14	12
19th ditto	13	6	7
20th ditto	10	4	6
21st ditto	10	5	5
22nd ditto	9	6	3
23rd ditto	9	5	4
24th ditto	4	2	2

After this the number gradually diminished, with occasional slight exacerbations.

Remained under treatment three men and three women.

Four nurses and four porters were taken ill; two of each died.

The treatment varied considerably. It consisted for the most part of bleeding, leeches, and ipecacuanha. Stimulants were employed only at the commencement. Towards the end a few experiments were made with ice, which proved its efficacy.

* Extracted from a paper published by Dr. Guntner, in the "Medicinische Jahrbuch" of Vienna.

† Under the Primar Physicians, Drs. Shifner, Reider, Czikaneck, and Saxinger. Reduced from the protocols of the hospital.

TABLE REDUCED FROM THE PROTOCOLS OF DR. VIVENOT'S CHOLERA HOSPITAL IN THE CITY, *From September 15 till October 20, 1831.*

Age.	Taken ill.		Cured.		Died.	
	Men.	Women.	Men.	Women.	Men.	Women.
From 10 to 20	5	6	4	5	1	1
20 to 30	5	14	4	9	1	4
30 to 40	6	10	2	7	4	2
40 to 50	6	8	2	1	3	3
50 to 60	3	6	1	2	2	3
60 to 70	3	3	0	0	2	3
70 to 80	0	1	1	0	0	1
Total	28	48	14	24	13	17

	Cases.		Died.		Recovered.
On the 15th of September	2	....	0	....	2
16th ditto	9	....	4	....	
17th ditto	28	....	16	....	12
18th ditto	12	....	5	....	7

After this the epidemic diminished most rapidly in this part of the town, as we see that in these three days more were seized than in the thirty following.

Remained under treatment, two men and seven women.

Four nurses and two porters were taken ill. The former all recovered; the latter both died.

The treatment was very antiphlogistic—viz. bleeding, leeches, acids, ipecacuanha, and sinapisms. Stimulants were seldom, and then sparingly, used, &c. Ice I believe never.

IN THE MILITARY HOSPITAL FOR CHOLERA.

	Patients arrived.	Recovered.	Died.
During Sept. ..	100	55	45
Oct. ...	169	112	57
Nov. ..	33	23	10
	302	190	112

From 5th till 17th of September, of 21 treated with stimulants, 7 recovered, and 14 died. After this they were treated almost exclusively with ipecacuanha and moderate warmth during the cholera; with bleeding, leeches, and sinapisms during the reaction; and with large doses of musk, camphor, and punch, when the patient fell into typhoid fever, with muttering delirium, black tongue, &c. These patients were all robust, and were attacked with cholera, mostly after having committed excesses in eating, drinking, and being then obliged to mount guard. Owing to these causes relapses were very frequent and often fatal. In two cases the patients had a return of most violent cholera, and yet escaped. No nurse was taken ill. One young surgeon died three days after having come to the hospital in the beginning of December, when instances of contagion were seen in other parts of the town.

CASE OF

VENTRAL PREGNANCY.

By J. Dickson, M. D., *Armagh.*

On Thursday, the 17th of May, about three o'clock p.m., I was called upon as dispensary physician, to visit Mrs. Walker, wife of a tradesman in this place, and who had been in labour since the preceding night.

On entering her apartment, I was informed that the waters had already broke, of which there was a great quantity; and that the pains were apparently strong and frequent. It was feared the pains were of little service. In the appearance of the woman at this time, there was nothing remarkable; she was extremely anxious, and expressed her fears for the result. She mentioned that her full time had passed; that the motions of the child were strong,

and she was at a loss to account for its not making greater progress. I endeavoured to remove her apprehensions, and laying my hand on her abdomen, which was unusually flaccid, nor more protuberant than is usual in the seventh month of pregnancy, I was unable to ascertain the uterine contractile efforts during a pain. Introducing my hand per vaginam, the parts had all the feel as if a large quantity of water had been recently evacuated, and were quite dilated; neither the os uteri, or any septum between the uterus and vagina, was perceptible. But what surprised me was, the absence of a presentation; by no means could I distinguish the presence of a fœtus in utero. I withdrew my hand, if not alarmed, impressed with the necessity for circumspection; but as I had often seen the pains become inefficient from the spontaneous breaking of the membranes, and consequent discharge of the liquor amnii, I considered it proper to suspend, for some time, the pains, and procure for the woman repose, of which she was very much in want. Before leaving her I inquired into her previous condition, and was told that this was her second pregnancy; that her first had been unusually tedious; and that my predecessor, Mr. Nesbit, had been obliged to deliver her with the forceps.

On the following morning I was again summoned, and found her much in the situation I have described above; she was more irritable; the pulse was quicker; she had vomited a dark-green-coloured fluid; there was no impediment to the discharge of the urine or fæces. I now made them acquainted with my apprehensions, that something very unusual existed in her case, but that of its exact nature I was uncertain, and requested that the assistance of another practitioner should be procured.

At noon there was no advancement in her labour; the constitutional irritation was increasing; she vomited repeatedly; the pulse was every hour becoming more frequent and small; her anxiety was excessive, and she implored me to relieve her in any way that I thought proper. My friend, Dr. Trevor, had been sent for, and until his arrival I begged of her to be patient, and endeavoured to keep up her strength by administering, at intervals, active stimuli. This gentleman being from home, it was five o'clock before he arrived; and a few minutes before that hour she expired, as much from exhaustion as from irritation, for during the latter part of her life the pains were almost incessant.

Post-mortem Examination.

On the following morning an examination of the body of the patient took place, in the presence of Dr. Trevor and one or two of the relatives of the deceased. The abdomen was greatly distended, and gave the feel as if a fœtus lay under the integuments. An opening being made, the first object that presented itself, was a fully-formed female child, perfect in all its parts, and not exhibiting a trace of decay. It occupied the entire extent of the cavity of the belly, from the innominata to the ensiform cartilage, resting upon, and nearly covering, the viscera. The head presented towards the pelvis, describing as usual at the commencement of natural labour the lateral aspect of its bason, though not occupying the cavity. The legs were doubled on the thighs, over which lay a fold or two of intestine. Having satisfied ourselves with its appearance in situ, Dr. Trevor removed it very quickly from the mother; and we proceeded to search for the placenta. This substance lay nearly under the child, with the maternal surface next to the intestines; but, to our astonishment, it was quite unattached to the mesentery, or any other part, and differed merely in being thinner and less vascular, from a placenta under other circumstances. It was also removed by the chord from its situation.

The uterus we found in its natural situation, perfectly healthy in its texture, pale, and about four times the size of one in the unimpregnated state. Its sides were about nine lines in thickness, and in its cavity there was a small quantity of coloured fluid. On its anterior surface, and a little above the cervix, we discovered a rent of about two inches in its greater (lateral) direction, the edges of the breach, which was quite open, presenting a ragged appearance; they were a little more vascular than the body of the uterus, though quite healed.

The colon was greatly distended with air; the intestines did not bear any marks of inflammation. All the other viscera were perfectly healthy, and in their natural situations.

I should mention that the child had no peculiar covering, nor could a trace of the membranes be discovered, or any sac capable of containing the large quantity of water that was discharged.

Upon a review of this case, which differs from any that I can find a record of, it would appear that the only prospect of relief that presented itself would have been by means of a section of the abdomen, and that of no trifling dimensions; but this from the constitution of the woman, and her rapid sinking, I feel confident she could not have survived. A fact with which I was made acquainted at the post-mortem examination elucidates the nature of the affection. In the fourth month of pregnancy she got a fall, in consequence of which the uterus was ruptured, and the

child passed through the aperture into the cavity of the abdomen, where it remained till the full period of utero-gestation would have been completed.

In a physiological point of view, it would be extremely satisfactory to understand by what means the nourishment of the fœtus proceeded,—as from the relative situation of the placenta and uterus in the abdomen, from the appearance of lining membrane of the latter organ, and also from the opening in the uterus bearing no proportion to the bulk of the placenta, both Dr. Trevor and I considered it quite impossible that they could recently have had any connexion.

Poynty-Pass, Armagh,
8th June, 1832.

TWO CASES OF

MALIGNANT CHOLERA

IN WHICH

VENOUS INJECTIONS

WERE SUCCESSFULLY EMPLOYED.

To the Editor of THE LANCET.

SIR,—In compliance with the wish of the professional gentlemen engaged, I transmit to you for insertion the two following cases of cholera treated by the injection of saline solutions into the veins. The operation was performed by Messrs. Little and Bennett,—in the first case, in the presence of Mr. Luff, the district-surgeon, and myself; in the second, in the presence of Messrs. Luff, Vandenburgh, Moore, and myself. Although the result has not been so satisfactory as we could have wished, still it will be seen that some, and even considerable, alleviation of the most urgent symptoms took place. As injection has been successfully practised in other instances, I am willing to hope that future experience will more completely develop the rationale of the practice, and the principles upon which it should be conducted, so that it may prove more uniformly successful. I shall, therefore, in the following detail, confine myself to facts, without offering a single comment.

I am, Sir, yours, &c.
ROBERT VENABLES.

7, Suffolk Place, Hackney Road.
June 29th, 1832.

CASE I.

On Friday morning, the 15th instant, I visited with Mr. Luff, a young man named John Tennant, aged about 24 or 25. We found him suffering from severe vomiting and purging of a gruelly-looking fluid, without any intermixture of either bile or fæces. The countenance was sallow and sharpened, and expressive of great languor and distress; the eyes deeply imbedded in the orbits; there were great coldness and flaccidity of the skin, and lividity of nails, extending along the fingers to the first and second joints; coldness of the tongue; pulse perceptible, but very weak and frequent, 120; great thirst; the patient constantly crying out for cold water; burning heat of stomach; urinary suppression for the last twelve hours. He had been taken ill the preceding evening, but no more perfect history could be obtained. Mr. Luff administered a dose of calomel, and the saline treatment was adopted and continued throughout the day.* In the evening, about half past six, he was visited by Mr. Little and by Mr. Bennett, and they found him much exhausted, probably from the immediately previous exertion of getting up to the close-stool. They found him pulseless, with all the symptoms much aggravated. It was now decided that the saline injection should be tried, and on visiting him at ten o'clock p.m. for the purpose of injecting the veins, previously to the operation the following minute was made of the symptoms:—

Pulse very feeble, thready, and easily compressed; frequency, 118; respiration, 37; temperature sublingual, F. 95°; axillary, 93°; palmar, 79°; meatus auditorius externus, 93°. The urinary suppression still continued; the vomiting and purging copious, and as frequent as before; the voice languid but audible. As the patient was considered to be somewhat improved since the visit of Messrs. Little and Bennett, it was agreed to defer the operation for an hour or two, to ascertain whether the amendment would advance. At half past twelve we again visited him, and found that the vomiting and purging of the gruelly-looking fluid continued as severe as ever. Feels much worse; feet more venous; the hands and forearms of a dusky-brown hue. Pulse 118, weak, and thready; intense thirst; "facies cholerica" well marked; respiration and animal temperature as before. Mr. Little now laid bare the basilic vein of the right arm, and having detached it, passed a probe under it. An incision having been made into the denuded vein, 50 ounces of a saline solution composed as follows, were slowly and carefully injected.

℞ *Sodæ muriatis*, ʒj;
Sodæ carbonatis, ℈j;
Potassæ chloratis, gr. vii;
Aquæ calidæ, temp. F. 110°. ʒxl.

* Consisting in the administration of carbonate and muriate of soda, with a small proportion of chlorate of potass in solution.

The temperature of the injection was kept up to 110°, by the occasional addition of a similar solution at a higher temperature, whenever the thermometer, which was kept constantly in the basin, indicated any reduction.

After twenty ounces had been injected, he expressed himself better, but complained of more pain in the abdomen. The pulse fell to 104°, was fuller and more regular. During the injection he complained of a sense of weight or fulness, with uneasiness in the chest, though we could perceive little or no alteration in the respiration. This was followed by a severe rigor, and a sensation of cold. He also had a fit of vomiting. These circumstances induced us to discontinue the injection, the pulse being 94, fuller, and steady.

Saturday, 1½ a.m. Complains of a good deal of pain in his abdomen, but says he feels quite strong. The countenance improved, eyes less sunk, and he converses more freely; pulse 98 and fuller; the coldness has been succeeded by a sensation of warmth. No evacuations.

℞ *Opii*, gr. ij;
Sacchari, gr. v. *M. ft. pulvis super. ling. imponend.*

* Half past two a. m. Has since vomited slightly, and has probably ejected the opiate.

Five a.m. Pulse perceptible only occasionally. No vomiting, but two dark evacuations have passed involuntarily. Has been delirious and very restless; is universally cold. *Repet. injectio.*

The tube was introduced into the same vein, but the injection was discontinued after the introduction of twelve ounces, in consequence of a slight extravasation of the fluid into the cellular substance surrounding the vein, and produced, as was supposed, by the laceration of the vessel by the point of the tube within the vein, and the friends not permitting us to expose another vein. This small quantity benefited him, but his friends observing him at seven a. m. to be almost insensible and sinking, allowed us to open a vein in the opposite arm. The pulse about 120, in other respects he was as bad as ever. The fluid injected consisted of the proportion of salts already specified, to sixty ounces of warm water. Sixty-four ounces, temp. F. 110°, were now slowly and carefully injected, the patient expressing no uneasiness during the process, except on one occasion, when in consequence of an accident which befel the thermometer, and broke it, the fluid was injected a little too warm. The pulse fell to 90, and was full. Without enumerating symptoms, suffice it to say, he was improved, and felt so.

[About half past nine a. m., I visited the case. I found him warm, and in a profuse perspiration. The countenance pale, the eye dull, languid, and suffused; subdelirium; pulse very languid, but still perceptible; temperature nearly natural. *R.V.*]

Half past ten a. m. Has been delirious and very restless; at present he is almost insensible, lies supine, throwing his arms about. When loudly questioned, says he feels quite strong; has no pain, but puts his hand to his head. The former dusky lividity of the face and lips has yielded to a bright-red hue. Eyes half closed and suffused; conjunctiva injected, red; pulse varying from 100 to 125, and weak. No evacuations of any kind; trunk and arms warm. Is in a profuse clammy sweat.

Vin. pro re nata. Hirud. no. vj fronti.

Noon. Pulse less and insensible.

Half-past two p.m. On entering the room found his relations weeping, and himself pulseless, and apparently moribund. As a *dernier ressort* we injected fifty-one ounces, composed as last, into the left basilic, with marked benefit. His pulse returned, he replied to questions, took drink, and after some time there was a perceptible difference in the temperature of the skin. Brandy p. r. n.

We returned at half-past seven p.m., and found him again pulseless, &c., but with more blueness than ever, indeed as marked as in any case which I have seen for some time past. I was again induced to inject; not with any expectation of success, but I felt justified by the circumstance of his having been so frequently relieved by it, and from the belief of myself and Mr. Bennett, who assisted me and watched the case throughout, that he was indebted for the last eighteen hours of his existence to the injections alone.

The fluid composed as at the first was introduced at the left median basilic. At first he began to speak, and resisted, but when about forty ounces were thrown in, his respiration became suddenly most laboured. The operation was discontinued, and within ten minutes he died.

Remarks.—The only explanation of the change produced during the operation, if it depended on it at all, is, that, emboldened by former events, the fluid was propelled onwards too rapidly. This closes Messrs. Little and Bennett's account.

Post-mortem Examination.

Drawn up by R.V.—About twenty minutes past nine Mr. Luff and myself called, and observed the following external appear-

* The remainder of the case to the dissection, is in the words of Messrs. Little and Bennett, who kindly sat up all night with this patient.

ness:—The face pale, with a collapsed and general shrunken appearance. The bulk greatly reduced; the eyes deeply sunk in their sockets. Leave was not obtained to open the body till Sunday evening at seven o'clock. We found the general appearance much altered from that of the preceding evening. There was more colour and general plumpness. There was much discoloration—greenish black about the face, neck, and the anterior upper third of the sternum, extending along the clavicles, over the scapulæ, and down the back. The fingers firmly incurvated, and livid. On incising the abdominal cellular covering, the cadaverous fœtor was infinitely more perceptible than in any of the other bodies which I have examined after death from cholera. The cellular tissues and muscles contained air, and the latter had lost their tonicity, and had some slight degree of crepitus. They presented a dark-livid colour. There were firm and extensive recto-peritoneo-intestinal adhesions, and the cadaverous fœtor on incising the abdominal cavity became remarkably sensible. On pushing back the sternum, the lungs were considered to be darker looking than natural; the pericardium remarkably so, with intense lividity of the muscular structure of the heart. The heart hypertrophied and elastic, apparently from air in its cavities. Crepitation. The substance rigid and firm, and on a superficial transverse incision of its substance there was no hemorrhage as I have observed in almost every other case. On puncturing the right auricle, air in quantity escaped. The blood within thick and viscid. In the left ventricle and aorta the blood was dark, firm, and clotted with a kind of fibrinous layer upon one of the clots. On incising the ventricles, gas or air escaped from all the cavities. The liver was very dark and livid, and the gall-bladder distended with bile. There were very extensive omento-intestino-peritoneal adhesions.

The intestines throughout presented a dark-livid appearance. The mucous membranes in some parts dark, in others nearly natural. There were no fæces, but there was a considerable proportion of a dark gruelly-looking mucus, similar to what passed by vomiting and purging. The spleen crepitous, and, on incision, bubbles of air or gas, with a frothy-looking fluid, oozed out from the incised surface. There were several fibro-cartilagineous spots on its edges.

The left kidney was invested by a serous-looking tumour; its substance extremely dark. The same observation applies to the right.

The bladder was flaccid, and contained about a table-spoonful of muco-purulent-looking urine, possessing, sensibly, the urinous odour. The brain was not examined.

CASE II.

Sunday evening, June 17, immediately after the above dissection, we visited —— Stutter, a woman aged 45,* who had been taken ill in the morning with symptoms of cholera—viz. vomiting and purging of a limpid, watery-looking fluid. We found her cold, and nearly pulseless. The tongue furred and rather dry.† She was perfectly well on Saturday evening, but about seven o'clock on Sunday morning she was seized with decided symptoms of cholera. We proposed the saline injection to the friends, and they agreed; but having to send some distance for the injecting apparatus, the operation was not commenced till within a few minutes of ten p. m.

In this case the respirations were 21 in the minute. The pulse in the temporal artery, 160;‡ sublingual temperal, 93° F.; axillary, 86; palmar, 80.§

Sixty-four ounces of the saline solution (without the chlorate of potass) at the temperature of 115° Fah. were slowly and cautiously injected into the cephalic of the left arm. After the injection of the first pint, the pulse was between 124 and 130; second pint, 124; third pint, 124 and 125; fourth pint, 120 and 123.

The syringe was now withdrawn, and as there were some slight rigors, three or four tea-spoonsful of brandy were administered, and directions given for the occasional administration of a little warm brandy-and-water by a tea-spoonful at a time. In the morning, about half-past one, we visited her and found her sleeping, with a degree of stertorous breathing, the natural temperature of the body restored, or perhaps somewhat elevated. Respirations 26 in the minute, the pulsations of the carotid 142. She died at two o'clock a. m.

Dissection.—There was nothing remarkable in the external appearances differing from others who have died of the same disease. The abdomen was rather tumid, and there was discoloration about the back. There was a large deposition of adipose substance. On opening the thorax the lungs appeared dark and congested. The heart contained air in both cavities, and in its muscular substance. The blood in the same condition as the preceding case. The liver rather dark, gall-bladder distended, and on incision of the substance of the

* Her appearance however would have led us to infer 55 or 60. Her friends stated that she was very much altered since the attack.

† This is unusual.

‡ It was not sufficiently sensible in the wrist to be counted.

§ The thermometer in this case was not so perfect a one as in the last.

liver, a spumous fluid oozed out. The same with the spleen. The stomach and intestines very much distended with air. The mucous lining natural. No fæces, but a quantity of gruelly-looking matter similar to what passed by vomiting and purging. The kidneys enlarged and dark-coloured. The bladder flaccid but empty, with the exception of about half a drachm of mucus, which exhaled no urinous odour.

P.S. Mr. Little has since injected three other cases with marked temporary, but no permanent, benefit. One case also has been unsuccessfully injected at the White House, Bethnal Green.

NEW TESTS

FOR

OXALIC ACID, TARTAR EMETIC, OPIUM,

THE ERGOT OF RYE, &c.

By JOHN S. HILEY, Esq., *Elland.*

AMIDST the many improvements that have been made from time to time in toxicology, there is yet room for more. No test of the presence of any poison is so contemptible, but it may be of some advantage, either in one case or another, and consequently the more means we can discover of making out any particular poison in a court of justice, the better are we prepared to meet such exigencies. There is no poison, whether of the mineral or vegetable world, with which we are so well acquainted as to be able to distinguish it in any mixture. They are all open to deception, and though we may have it in our power to discover them in one solution, yet it is very doubtful whether we can find them in another. The changes which take place in the stomach are constantly acting on the drug, and thus rendering it incapable of being affected by those tests which we employ in its pure state, and in many instances the least variation in point of mixture, as using spring water instead of distilled, or adding too much or too little of any menstruum, is sufficient to destroy, almost in every point, the customary changes which each re-agent is expected to produce.

Such being the case, I consider it highly necessary that toxicologists should be possessed of as many means of discovering poisons as can possibly be procured, and with that idea I send you the results of a few experiments which I have lately made on Oxalic Acid, Tartar Emetic, Tincture of Opium, and the Tincture of Ergot of Rye, which I hope may be of use to your readers, and thus afford some assistance where assistance is most required. It may be said, that after what Dr. Christison has written, there is no necessity for more being advanced; but I would add, that Dr. Christison has by no means exhausted the subject, and that as long as any addition can be made, that addition is acceptable. Cases of poisoning are every day becoming more common, and therefore the law demands that every assistance shall be rendered by means of which it may be discovered how the diseased came to so untimely an end, and thus satisfy at once the anxiety of troubled relatives, and the call of a clamorous public. In order to make the subject more concise, I will confine my remarks on each poison under one short chapter, and in the first place will notice the

OXALIC ACID.

This poison is one of the few to which suicides generally have recourse, and which has sometimes been taken by mistake for the sulphate of magnesia. It may however be readily distinguished by the crackling which it causes on its solution in water, or by the formation of the oxalate of lime, the oxalate of copper, or the oxalate of silver. These have been examined by Dr. Christison, and, as they have been found of the greatest value, have maintained their rank in the opinions of medical men. In your excellent Review, Mr. Editor, of Dr. Christison's paper on this poison, you have noticed a very beautiful property which caustic ammonia has upon oxalic acid. Allow me to say a word or two respecting it. You observe that oxalic acid possesses the property "of being precipitated in singularly beautiful stellated crystals by caustic ammonia; if, therefore, as often occurs in practice, a minute crystal, say the fiftieth part of a grain in weight, be found adhering to a paper, or accidentally scattered on the table where the admixture was made, by dissolving this in a drop of distilled water on a watch crystal, testing it with a particle of litmus paper, and adding a drop of strong caustic ammonia, a beautiful radiated star is immediately produced." Now, Mr. Editor, I do not wish to appear impertinent; I am not one of those who make it their study to find fault with the works of other people, or to cavil with them on the detection of some slight error which, strictly speaking, is of so little consequence, that it may be safely overlooked; but really I think that this test, so excellent and so serviceable as it promises to be, ought to be understood as to its effects in every point, and as such I have taken it upon me to add something to what you have already said. In noticing it then it may be worthy of remark, that the particle

of oxalic acid ought not to be entirely dissolved, as the star is not then produced, but two or three atoms should be left remaining at the bottom of the fluid, and the stars, in about one minute after the ammonia is added, will begin to make their appearance, shooting out as it were from the body of the particle. You say that the oxalic acid ought to be dissolved, if so, you must either have made some mistake, or your caustic ammonia and mine differ in point of strength. I can hardly think that the deficiency is on my side, as the ammonia with which I tried the experiment was fresh, and certainly as strong as any that I had ever before made use of, if not stronger; besides that, I purchased small quantities of this article at different shops as strong as I could procure, and repeated the experiment with each, but the effect was the same. The experimentalist ought not to confine himself to one drop of ammonia, as two or three drops will often produce the effect much more sensibly. When what I have thus advanced is borne in mind, I can confidently say, that the test is a most excellent one, but if you in the least doubt my criticism, you will oblige me by repeating the experiment. I will now proceed to my own observations. I have often noticed that the interposition of a third agent is sometimes of the most essential service in toxicology. This idea I took from Mr. Dodgson's test for arsenic, and accordingly I have followed it up with some effect, as you will presently see. The least worthy of the two tests for oxalic acid which I am about to lay before you is the following:—Pour about two drachms of a moderately strong solution of oxalic acid, say three or four grains of the salt to half an ounce of distilled water, into a test glass, or tube; the first is perhaps the most suitable, then add to it nearly the same quantity of the solution of bichromate of potassa of the same strength, and afterwards let fall into the mixture a few drops of rectified spirit. A fine light port-wine-coloured ring immediately forms on the surface, or a little below, gradually spreading downwards; but if, instead of waiting this change, the liquid be shaken, the colour is lost for a few seconds, and then the whole begins to regain its former shade. The time that elapses during the accomplishment of this change does not exceed half a minute. Less quantities of both the poison and tests will answer equally well, as for instance, from one drop to ten of each, though the stronger the solution be, the more sensible will be the change, and when placed on a dirty cloth, or the experiment is performed on a dull day, then the effect is very perceptible. In some cases the colour, after standing a short time, is not so dark as at first, yet on keeping the mixture a day or two it becomes exceedingly dark. There is another way of trying this experiment, where the colour, instead of being that of port-wine, is a beautiful lilac, and from which a rather singular smell arises, somewhat similar to that of ink, but much stronger. This happens when the solution of bichromate of potassa, holding about eight grains of the salt to an ounce of water, is in the quantity of about half a drachm to a drachm and a half of the oxalic acid solution of the like strength, and the rectified spirit in the same proportion (ten drops) as in the first experiment. The mixture is shaken, and the port-wine shade appears as before, but after standing a few minutes it changes to a dun lilac. It may be well to remark, that if the bichromate of potassa be more plentiful than is laid down above, the first colour remains unchanged. The next test for oxalic acid is the solution of bichromate of potassa, and the solution of the hydriodate of zinc. This is a very excellent test, and one which, as far as my own observations go, can be depended upon with safety in cases of medical jurisprudence. What effect it might have upon oxalic acid when mixed with the matter drawn from the stomach I cannot pretend to say, but certainly in other respects it is deserving of every attention. The mode of trying it is the same as in the last experiment, except that instead of making use of the rectified spirit, a few drops of a solution of the hydriodate of zinc must be added to the mixture. This done, the liquid, from being a fine yellow, becomes of a deep brandy colour, growing instantly darker, and then letting fall a black heavy precipitate, leaving the supernatant liquor a second time of a brandy shade. The sediment adheres all down the sides of the glass, and as it subsides gives off a strong smell of iodine. Before we conclude this head, it may be advisable to add, that when equal proportions of the solutions of oxalic acid and bichromate of potassa are mixed together, the liquid, being set aside for an hour or two, changes from a fine yellow to a permanent brandy colour, not unlike that developed from the same mixture by alcohol.

TARTAR EMETIC.

I have examined the various works containing any account of this salt, but in none of them can I find any mention made of the property which the bichromate of potassa has upon it. Whether writers thought it hardly worth noticing I cannot say, but in my humble opinion it ought by no means to be omitted, as it may be numbered with the other tests for tartar emetic with the greatest propriety. Pour a small portion

of a moderately strong solution of tartar emetic into a test glass, and add to it a few drops of a solution of bichromate of potassa of the like strength. The mixture instantly assumes a singular dun colour, as though a precipitate was falling, but after standing a minute or two it assumes a beautifully fine green without any sediment. Under certain circumstances it is longer, or does not change at all, that is, when too much of the bichromate of potassa has been made use of. The green has a finer appearance when the test is added in smaller proportions, but the first colour is not so sensible. Emetic tartar possesses another property which I think has not been noticed, that is, in instantly robbing the tincture and the watery solutions of iodine of their colour; add to this, it also disperses the dark blue produced by adding starch to iodine.

OPIUM.

As there has always been some difficulty in testing vegetable poisons, it is necessary that as much time be employed in examining into their properties as possible, that by so doing, the veil that encircles them may be drawn aside, and they may thus appear before us as well understood as the mineral poisons. Amongst a number of experiments which I have lately instituted on the tinctura opii, I have stumbled upon two or three re-agents, which I conceive may be of some benefit to toxicologists; consequently I do not delay to lay them before you. The first and most sensible is the bichromate of potassa. This very useful test, when added in small quantities to highly-diluted laudanum, lets fall a very copious light-yellow precipitate, which is soluble in muriatic acid, leaving the liquid of a dark-brandy colour. When caustic potassa is added to diluted tincture of opium, the tincture is decomposed, and lets fall a rather plentiful dirty-white precipitate; but if a little of the mixture is poured into a test tube, and then applied to the flame of a spirit lamp, this precipitate after a short time begins to run into flakes of a dark colour, and as the liquid becomes hotter they disappear. The mixture is then fine and clear, but as it cools, a part of the precipitate is again thrown down. This is, in my opinion, an excellent test; the tincture may be diluted to almost any extent, till it is nearly colourless; but still the change is effected, except that the flakes are not so perceptible. In conjunction with Mr. J. T. Cooper's test, the muriate of gold and a few drops of caustic potash, it will prove, I may confidently say, of essential service, as it strengthens his re-agent, and places the poison in question almost beyond a doubt. But few of the tinctures undergo decomposition, when cold, with caustic potash, and though the Pharmacopœia mentions this change with opium, yet it makes no allusion to its running into flakes, and disappearing when heated, or re-appearing again when cold. On this property I bring it forwards as a test for laudanum, and I do not doubt but my assertions, on examination, will be found established on firm grounds.

ERGOT OF RYE.

Though the ergot of rye, as far as I can learn, has never yet been made use of as a poison, yet that is no argument but it may be applied to that purpose, either intentionally or unintentionally. That it possesses poisonous properties cannot be doubted, when we have once beheld the remarkable effects which a very small quantity of it has in exciting the action of the uterus, as such therefore it is only a mark of prudence if we make every discovery in our power of the various tests and re-agents which it may possess, and thus prepare ourselves for any evil that may occur. The ergot of rye is but of late introduction into practice; consequently it is yet imperfectly known; but we have every reason to suppose, that as it becomes more common, recourse will oftener be had to it as a means of committing suicide. Opiates formerly were never used as poisons, because the world was almost unacquainted with them; but now, when they are known to every one, they are as often used for destroying life as any other drug. Such being the case, is there not every likelihood that the ergot of rye, at some future period, will be taken with the same design, and thus require the means of discovering what it really is before a court of justice? I will now proceed to examine it. Caustic potash has a very singular effect upon the tinct. secal. cornut. The following are the items:—to about half a drachm of water add two or three drops of the tincture of the ergot of rye, then let fall into the mixture three or four drops of caustic potassa, and it instantly assumes the colour of cape wine, lighter or darker, according as there is more or less of the tincture made use of. Apply this, in a test-tube to the flame of a spirit-lamp, and after it has boiled for about half a minute or less, nay, sometimes before it has reached the boiling point, reddish woolly flakes, according to the colour of the liquid, not unlike the detonating cyanate of silver, begin to make their appearance, moving about the fluid, and as it cools falling to the bottom. The stronger the mixture, the more flakes are produced; and the deeper the colour, the redder the precipitate. This is a very delicate test, and however highly the tincture may be diluted, providing enough of the alkali is added, the flakes are very perceptible. But the effects of this test do not

entirely rest here. The change which the potash produces on the diluted tincture, in turning it from a nearly colourless liquid to the clear shade of the best cape wine, is not of the least consequence, and though it alters the colour of almost all tinctures more or less, yet none of them are so powerfully affected as this; add to this, heat strikes it still deeper. Nitro-muriate of gold, after standing for some time, throws down a cloudy yellow precipitate from the tinct. secal. cornut.

VARIOUS POISONOUS TINCTURES.

It may be well to notice what effect the two tests just mentioned have upon a few of the other poisonous tinctures, and we shall then be better able to judge of their value over any single one. The tinctures of hemlock and henbane are precipitated, on boiling with caustic potash, in the same manner as the ergot of rye, and there would be some difficulty in distinguishing the precipitate belonging to the latter from that of the ergot, but for the assistanee rendered by the muriate of gold. With this test both tinctures are precipitated; but that of the henbane is much longer in falling, and is perhaps not quite so plentiful. The hemlock is still more easily distinguished. The liquid, when the potash is added, has a greenish-yellow appearance, as have also the flakes, whereas the ergot-of-rye solution puts on a fine cape-wine shade, and the precipitate a reddish one. With the muriate of gold the tincture of hemlock is made turbid. None of the other tinctures are affected when boiled with potash, but the gold test has a rather singular effect upon most of them. From the tincture of digitalis, diluted till nearly colourless, it throws down a rather copious green precipitate, not unlike the powdered leaves of that plant, which being set aside for about a day, becomes of a dark-brick colour; from the tincture of hops a sediment is let fall, somewhat similar to that of the ergot of rye; and in the tincture of black hellebore, after standing a length of time, it causes a muddiness, and afterwards a purple precipitate is produced, which adheres to the sides of the glass. These three last poisons, however, are by no means affected when boiled with a few drops of caustic potash, consequently if their precipitates resembled in every point that of the ergot of rye, this difference would be enough to distinguish them. It would seem, from the above observations, that the vegetable poisons are not altogether unworthy of further research; and were it not that the limits of my paper are already extended much further than I at first designed, I would devote a page or two more to the subject.

Elland, near Halifax, June 19, 1832.

ESSAYS

ON

ANIMAL ACTION.

By WILLIAM DOBSON, *Esq., Surgeon, Pimlico.*

No. VI.

RESPIRATION.

It has been considered that the motions of the abdominal muscles are active in breathing; that it is by their agency that the diaphragm regains its position in the chest. Sir C. Bell asserts, that "when air is admitted into the lungs, that air is again expelled by the reaction of the abdominal muscles. These muscles compress the viscera, and by pushing them up, raise the relaxed diaphragm, preparing it for another effort of inspiration." And he goes on to say, "Is it not obvious, that if the power of the abdominal muscles be lost, the respiration must stop?" No: if the abdominal muscles of a dog be divided transversely so as to expose the diaphragm, we perceive that this organ descends into the abdomen, and ascends into the chest, as efficiently as if the abdominal parietes had remained entire. These phenomena I have frequently witnessed when dividing the par vaga below the diaphragm.

This is very cogent circumstantial evidence. It proves, that without the assistance of the abdominal muscles expiration or the return of the diaphragm into the thorax *can* be accomplished. And does it not tend to prove the passiveness of those muscles in ordinary expiration?

Another argument more powerful than the last is, that the abdominal muscles are supplied by nerves of the *voluntary class*—by the dorsal and lumbar which imbue other muscles in which they ramify with the voluntary characters *solely*. Therefore on these data, I conceive, we may boldly and fearlessly deny, that the abdominal muscles *do* or *can* maintain a perpetuity of action, that they are involuntary organs. I consider them as mere passive agents in breathing, being thrust forward during inspiration by the descent of the diaphragm throughout the medium of the intervening viscera, and returning *passively* from the ascent or relaxation of the diaphragm.

The abdominal muscles exert a considerable influence over the movements of the chest. But in what manner do they exert this influence? They check respiration, and stop it, in obedience to the will; the experiment every one can perform. In holding of the breath, they prevent the

expansion of the base of the chest; for this operation is distinctly a muscular effort; and if the abdominal muscles be not the sole agents in this act, they are the principal ones.

When respiration is restrained for even a few seconds, a most uneasy sensation is experienced in the chest, and the seat of this anxiety is referable to the diaphragm. It appears to arise from an instinctive and irresistible desire of the diaphragm to resume its contraction or to return to a passive state. It thus counterbalances the restraining agents; the pressure of the muscles on the exterior of the chest.

No sooner does the fœtus emerge from its aqueous abode into an aërial atmosphere, than it begins to breathe.

During the fœtal period, it is presumed that no animal or visible action is performed; that none but the organic functions exist, — such as circulation, nutrition, growth, &c. But when the child is born it is brought into relation with the external world, and is subjected to its moral and physical influences; it is cut off from its mother, and has to subsist as an independent creature. A number of operations arise into existence, such as respiration and the voluntary movements, the external senses, and the various secretion.

Our next considerations, then, will be to ascertain, 1st. Why respiration commences instantly after birth. By what agency is the action induced? 2nd, And where does the consciousness of necessity reside? 3rd. The imaginative Buffon conceived that man might be made an amphibious creature. He commenced the elucidation on "puppies;" but experiment soon determined the fallacy of the notion. He decided that the life of quadrumanous animals could not be preserved without the inhalation of air. And it is incontestably established, that a regular supply of atmospheric air is essential to the existence of every animate being. Even the plant which is fixed to the surface of the earth, and the fish which dives in the ocean, and every animal that roams on the surface of the globe, all demand a constant supply of atmospheric air. But the means by which air is received and appropriated to the purposes of life, vary, as we rise or fall, in the scale of vital existence. Vegetables, and some of the lower orders of the animal creation, absorb the air through their external porous surfaces without any recognisable action or destined apparatus. The fish species imbibes the air into their branchiæ or gills, many of them without any active effort; but terrestrial animals and the amphibiæ possess an active respiratory apparatus. They have lungs enclosed in an elastic case, which alternately expands and contracts to admit the air, and expel it when its virtues are exhausted. The agent which excites these motions is the diaphragm, and this organ is endowed with a power of involuntary action.

Breathing must commence soon after birth, or death will ensue. Then "where does the consciousness of necessity reside?" Not in the blood, we presume, nor yet in the lungs; but I believe *in the diaphragm*? In the diaphragm, like the heart, there is a tendency to incessant motion during the life of the animal. But prior to the natal period, the heart exists in perpetual activity, whereas the diaphragm is motionless. Nature so economises her machines, that whenever there is no necessity for the actions of an organ she never expends it in vain. The heart appears to move and circulate the fluids from the earliest period of embryotic existence until the extinction of life. But respiration needs not to exist before birth. The mother supplies the embryo, or the fœtus, with blood, and in a fit condition for its growth and vitality. But when the materno-fœtal separation occurs, the child has to purify blood for itself. Being unconscious that it has to breathe there can be no desire to perform the operation, but so wisely and so designedly is the mechanism of nature constructed, that each individual part seems to know its office, and fulfils it without any compulsatory effort. For as soon as the fœtus has burst through the trammels of its uterine abode, the diaphragm bounds into motion with alacrity and vigour, and sometimes for a century continues this motion. Why did not the diaphragm play before birth? We have shown that the action is unnecessary. This ought to be sufficient to satisfy even the most sceptical mind. From deliberate and intense inquiry I am disposed to consider respiration as more a mechanical act than physiologists are accustomed to do; and that not only the performance and continuance of this function derive their influence from a mechanical agency, but that the very first motion derives its existence from a similar cause.

How slight a pressure on the thoracic parietes will arrest the heaving of the chest, even in the adult! How essential to the free motions of the chest that it should be immersed in an aërial medium; and, further, that the density of this medium should be of an invariable and definite character! When an animal is completely immersed in water, the diaphragm cannot expand the chest; not arising, however, it is presumed, from the surrounding pressure, but from deprivation of atmospheric air. But when only the chest is immersed in an aqueous medium, breathing is laborious: the "bather" feels the necessity of exerting

his voluntary muscles to expand the chest, the power of the diaphragm being insufficient. When the fœtus is in the matrix, it is contained in a resisting medium, and surrounded by textures of such dense characters, as to be incompatible with motion of the fœtal chest. But when the child has emerged from the uterus, the thorax is relieved from the pressure which it had previously sustained. Life is evinced by motion of the limbs, and by an effort to breathe. But sometimes this effort is so feeble as not to be perceptible until a few seconds have elapsed, and frequently respiration is not fully established for a considerable time. Occasionally, however, the very first respiratory effort is loud and powerful. I conceive that there is a disposition in the diaphragm of the fœtus to contract, and thus expand the chest, but that this contraction is prohibited by the circumambient resistance, which no longer exists when the fœtus is expelled.

STRUCTURE OF THE

HUMAN PLACENTA,

AND ITS

CONNEXION WITH THE UTERUS.

(Analysis of a Paper by Dr. ROBERT LEE, *lately read before the Royal Society.)*

In the year 1780 John Hunter presented a paper to the Royal Society in which he claimed the discovery of the true structure of the placenta, and of its communication with the vessels of the uterus. His conclusions were drawn from the dissection of a woman who died undelivered, near the full term of utero-gestation. The veins and arteries of the uterus were injected, and an incision made through its parietes at the part to which the placenta was attached. Between the uterus and placenta lay an irregular mass of injected matter; from this mass regular pieces of the wax passed obliquely between it and the uterus, which broke off, leaving part attached to that mass. On attentively examining the portions towards the uterus, they plainly appeared to be a continuation of the veins passing from it to this substance, which proved to be the placenta. Other vessels, about the size of a crow-quill, were seen passing in the same manner, but not so obliquely. These, when examined, were discovered to be continuations of the arteries of the uterus. The veins were next traced into the substance of what seemed to be placenta; but they soon lost the regularity of vessels, by terminating at once upon the surface of the placenta, in a very fine spongy substance, the interstices of which were filled with yellow injected matter. On tracing the arteries he found that, having made a close spiral turn upon themselves, they were lost on the surface of the placenta. On cutting into the placenta, he discovered in many places of its substance, yellow injection, in others red, &c.; in many others there were two colours mixed.

From these appearances Mr. Hunter inferred, "that the arteries which are not immediately employed in conveying nourishment to the uterus go on toward the placenta, and proceeding obliquely between it and the uterus, pass through the decidua without ramifying. Just before entering the placenta, after making two or three close spiral turns upon themselves, they open at once into its spongy substance, without any diminution of size, and without passing behind the surface as above described."

Dr. W. Hunter's description of the vascular connexion between the uterus and placenta, coincides with that of his brother, "for it seems incontestable," he observes, "that the human placenta, like that of the quadruped, is composed of two distinct parts; viz. an umbilical and a uterine; that each of these parts has its peculiar system of arteries and veins; and that the circulation through these two parts of the placenta differs in the following manner:—in the umbilical portion the arteries terminate in the veins by a continuity of canals, whereas in the uterine portion there are intermediate cells into which the arteries terminate, and from which the veins begin.

Noortwych, Rœderer, and Haller, had failed to determine in a satisfactory manner, the existence of a vascular connexion between the uterus and the cells of the placenta; and the opinions of the Hunters have been received by all anatomists to the present day. In the present paper Dr. Lee describes certain appearances, observed in the dissection of six gravid uteri, and many placentæ expelled in natural labour, which seem to demonstrate, that a cellular structure does not exist in the placenta, and that there is no connexion between this organ and the uterus, by great arteries and veins.

When an incision is made through the gravid uterus where the placenta does not adhere, numerous minute blood-vessels and fibres will be observed passing from the inner membrane of the uterus to the decidua. At the circumference of the placenta, the membrana decidua separates from the other membranes to pass between the uterus and placenta, and thus forms a complete septum interposed between these organs. The

chorion and amnion cover the fœtal surface of the placenta, and between these two membranes and the decidua lie the ramifications of the umbilical vein and arteries, subdivided to an extent almost indefinite, and connected together by white slender filaments running in various directions. Such is the internal structure of the placenta, and it adheres to the fundus or some part of the uterus by innumerable flacculent fibres and vessels. With the fibres uniting the placental decidua to the uterus are mingled numerous small blood-vessels, proceeding from the inner membrane of the uterus to the decidua, and these vessels exist universally throughout the whole extent of the membrane. There is no vestige of the passage of any great blood-vessel, either artery or vein, through the intervening decidua, from the uterus to the placenta, nor has the appearance of the orifice of any vessel been discovered, even with the help of a magnifier on the uterine surface of the placenta; no cells are discernible in the structure by the minutest examination. At that part of the uterine surface to which the placenta has been adherent, there are observable a great number of openings, leading obliquely through the inner membrane of the uterus, and large enough to admit the point of the little finger. Over these openings in the inner membrane of the uterus, the placenta covered by deciduous membrane, is directly applied, and covers them in such a manner, that the maternal blood, as it flows in the uterine sinuses, cannot possibly escape, either into the cavity of the uterus, or into the substance of the placenta.

When air is thrown forcibly into the spermatic arteries or veins, the whole inner membrane of the uterus is raised by it; but none of the air passes across the deciduous membrane into the placenta, nor does it escape from the semilunar openings in the inner membrane of the uterus, until the attachment of the deciduous membrane to the uterus is destroyed. There are no openings in the deciduous membrane, corresponding to the valvular apertures now described in the inner membrane of the uterus.

If a placenta, recently separated without any artificial force, be examined, the surface will be found uniformly smooth, and covered with the deciduous membrane, which could not have been the case, did any large vessels connect it with the uterus.

The placenta in a great majority of cases is detached, after labour, with the least imaginable force, which would be impossible, if a union by large vessels, possessing the ordinary strength of arteries and veins, actually existed.

Haller, the Hunters, and Monro, do not seem to have examined the gravid uterus or its contents in the natural state, but after fluids had been forcibly thrown into the hypogastric and spermatic arteries. This artificial process was followed by a laceration of the deciduous membrane, covering the orifices of the uterine sinuses, and deposits of injection were formed in the substance of the placenta, giving rise to the deceptive appearance of cells. That such was the fact is rendered more than probable by the result of examinations made by Dr. Nimmo and Mr. Broughton, at Dr. Lee's request, of the preparations of the gravid uterus in the Hunterian museum at Glasgow. In many of them the deposits of injection, causing the appearance of cells, were evidently the result of extravasation.

No preparation in the collection seems to have been expressly made for the purpose of proving or disproving the fact, that the decidua passes over the uterine surface of the placenta; but in reference to the preparation R. R., No. 139, Dr. Nimmo remarks, that no vascular openings are visible in the membrane interposed between the uterus and placenta.

Dr. Lee examined a preparation of the gravid uterus in the museum of the Royal College of Surgeons of London, supposed to have been put up by John Hunter nearly fifty years ago. The deciduous membrane was everywhere covered with minute tortous blood-vessels, proceeding from the inner surface of the uterus, and filled with injection. There was no appearance of vessels of any size passing between the inner surface of the uterus and placenta; but flattened portions of the injection were observed in this situation, having in many parts the form of thin layers, which had obviously escaped from the orifices of the uterine veins. Elsewhere the injection had lacerated the deciduous membrane, and formed deposits in the vascular part of the placenta.

From these facts Dr. Lee concludes, that the human placenta does not consist of two parts, maternal and fœtal; that no cells exist in its substance; and that there is no connexion between the uterus and placenta by large arteries and veins. The deciduous membrane being interposed between the umbilical vessels and the uterus, whatever changes take place in the fœtal blood, must result from the indirect exposure of this fluid as it circulates through the placenta, to the maternal blood flowing in the great uterine sinuses.

COURT OF COMMON PLEAS,

WESTMINSTER, MONDAY, JUNE 25, 1832.

RAMADGE versus WAKLEY.

Before MR. JUSTICE BOSANQUET, *and a* SPECIAL JURY *consisting of the following Gentlemen*:—

Benjamin Adam, Esq., Lower Homerton, Hackney, merchant.
Robert Henry Close, Esq., 10, Montagu Square.
Charles Cook, Esq., 45, Doughty Street, Pancras.
Abraham Cooper, Esq., 13, New Milman Street, Pancras.
T. Eldred, Esq., Highbury Terrace, Islington, merchant.
George Hadden, Esq., 15, Highbury Terrace, Islington, merchant.
John Hawkes, Esq., Upper Holloway, merchant.
Robert Mundell, Esq., Cheyne Walk, Chelsea.
Michael Oppenheim, Esq., Mansell Street, merchant.
John Rolls, Esq., King's Road, Chelsea.
William Thickbroom, Esq., Eaton Square, Hanover Square.
John Tracy, Esq., 10, Brudenell Place, merchant.

Counsel for the plaintiff Mr. Serjeant WILDE, Mr. Serjeant SPANKIE, Mr. ADOLPHUS, and Mr. WHITE.

Counsel for the defendant, Mr. Serjeant JONES and Mr. KELLY; but as Mr. WAKLEY addressed the jury and cross-examined the witnesses on his own behalf, both these gentlemen were prevented, by the etiquette observed at the bar, from rendering him any assistance openly in court.

Attorney for the plaintiff, Mr. WILLIAMS, Ely Place. Attorney for the defendant, Mr. LOFTY, King Street.

Plea, the *general issue*—*Not Guilty*.

In consequence of Mr. Wakley's absence, he having been unexpectedly detained in the country, the court was so obliging as to wait half an hour, but not having arrived at that time, Mr. Serjeant Wilde intimated his right to commence, and the Judge having assented, the learned gentleman opened the case in a very candid speech to the jury. Mr. Wakley entered the court exactly as the learned serjeant concluded his address.

Mr. Serjeant WILDE then called Dr. Hue to prove that the plaintiff was a fellow of the Royal College of Physicians. Mr. Wakley having declined to cross-examine the witness, Mr. Bradford, a surgeon and apothecary, residing in Fleet Street, was called on behalf of the plaintiff, and having been subjected to a long cross-examination, the alleged libel, originally published in the 419th Number of THE LANCET, was put in, and read by the officer of the court. It was substantially the same as in the following cause, but in the form of a letter, addressed To the Editor of the Lancet, and signed "One."

Mr. Serjeant WILDE then said—"That is my case, my Lord."

Mr. WAKLEY now rose, and expressed much astonishment at the learned serjeant's declaration that that was his case, inasmuch as the averments for the major part remained unproved.

The Judge, however, having decided that sufficient had been proved for the case to go to the jury, Mr. Wakley addressed the jury on the facts as they had been elicited in the evidence, and commented with much severity on the plaintiff's treatment of Miss Bullock, and on his unjustifiable advocacy of John Long, the individual found guilty on a trial at the Old Bailey, of the manslaughter of Miss Cashin.

Having concluded his address, the gentlemen of the jury turned round in the box to deliberate, and after a few minutes one of them addressed the Judge with a view of ascertaining if a verdict of "one shilling" would entitle the plaintiff to costs, and having been informed that it would, they again deliberated for a few minutes, and returned a verdict for the plaintiff—

"DAMAGES, ONE FARTHING."

RAMADGE *versus* RYAN AND OTHERS.

On the following day, Tuesday, the cause of Ramadge *v.* Ryan, Renshaw, and Rush, was called on for trial before Chief Justice Tindal and a special jury.

The four counsel for the plaintiff were the same as in the foregoing cause, and Mr. Serjeant Taddy and Mr. Erle appeared for the defendants; in this case the defendants put in, in addition to the plea of the *general issue*, a plea of *justification*.

Mr. Serjeant WILDE having opened the case, and called Mr. Bradford as a witness, who gave testimony similar to that on the preceding day, the libel was put in and read, as follows:—

"TWEEDIE *v.* RAMADGE.—Dr. Ramadge was in attendance on a case of typhus; the patient (a young lady) was bled from the arm on a Friday, and eight dozen leeches (96) applied to the head and neck. On Saturday both temporal arteries were opened,—the patient fainted, and the apothecary (who was likewise in attendance) left her; the nurse brought her round with wine and water. On the Sunday, another dozen

leeches were applied, and immediately she became delirious; when Dr. Tweedie's advice was requested by the relatives.

"Dr. Tweedie having spoken apart with Dr. Ramadge, addressed Mrs. Reynolds, the sister of the patient, and said, 'That having attended before, he should be happy now to give his assistance to the young lady, but that Dr. Ramadge's conduct in a late correspondence with John Long had been such, that no medical man of respectability could call him in or consult with him without injuring himself in the eyes of his brethren. That he (Dr. Tweedie) bore no private pique against Dr. Ramadge,—he believed him indeed to be clever; but his character, as respected the above transaction, rendered it imperative for all medical men to decline acting with him; and Mrs. Reynolds must choose which she would entrust. Dr. Ramadge replied in great anger, that he was a gentleman by birth, education, and profession, but that Dr. Tweedie was neither. * * * Dr. Tweedie answered him by turning coolly on his heel and walking out of the room. Dr. Tweedie was retained, and cured the patient by exactly opposite treatment. Dr. Ramadge (it is said) frequently is at supper with John Long.—*Lancet.*"

"Dr. Tweedie has honourably and faithfully discharged his duty to his medical brethren; and we hope every one else will do the same. We are well aware who it is—and a medical man to boot—that makes the trio in these family suppers. Let him be warned in time. He takes upon him to defend this nefarious quack and manslaughterer in the face of the whole profession: let him take warning, or we will not spare him.—*Ed. Med. Surg. Journal.*"

Mr. Serjeant TADDY then addressed the jury for the defence, and in the course of his speech observed, that he was prepared to justify the statements in the alleged libel, although his clients had offered an apology to the plaintiff. The learned serjeant reminded the court that the objectionable article was first published in THE LANCET, and that it had merely been copied into the defendant's journal.

At the close of this address Mr. Serjeant Taddy called Dr. James Johnson, Mr. Brodie, and other medical gentlemen, to state their opinions respecting the conduct of Dr. Ramadge as connected with his public vindication of John Long.

Chief Justice TINDAL in summing up remarked, that since a justification had been pleaded, the apology formerly tendered to the plaintiff could not now avail the defendants. The jury having retired to consult for a short time, returned with a verdict for the plaintiff,—DAMAGES, FOUR HUNDRED POUNDS.

THE LANCET.

London, Saturday, June 30, 1832.

Two causes, involving questions of alleged libel in matters relating to medical journals and medical practice, were tried in the Court of Common Pleas, on Monday and Tuesday last. The disputed articles will be found at length in other parts of THE LANCET, together with the respective awards of the juries. In the case tried on Monday, Dr. RAMADGE was plaintiff, and the EDITOR of this journal defendant—plea, the general issue—when, after a trial which occupied the Court from ten o'clock until nearly four, a verdict was given for the plaintiff, with *one farthing* damages. The defendant, having pleaded his own cause, was deprived by the etiquette which is observed in courts of law, of the powerful aid which otherwise might have been openly rendered to him by his highly eminent counsel Mr. Serjeant JONES and Mr. KELLY. The defendant, however, acknowledges, with a grateful warmth of feeling, the assistance which he obtained from the learned gentlemen by their suggestions privately communicated during the progress of the cause.

Devotedly as we are attached to the liberty of the press, we might have yielded a few of our columns to remarks connected with the trial of Monday, had we not been suddenly and unexpectedly checked by what we cannot avoid deeming the extraordinary result of the deliberations of Tuesday. Entertaining towards Dr. RYAN neither a friendly nor an unfriendly feeling, the character of the alleged libel, and the circumstances under which it was published, compel us to look upon an award of four hundred pounds as an amount of damages unusually excessive. What a contrast! *One farthing* on the Monday, and *four hundred pounds* on the Tuesday, as a

compensation in damages for an injury of precisely the same extent in its primitive character! But mark! The journal against which the lowest coin in the country was given, is circulated to an extent beyond comparison greater than that publication the Editor of which is cast in half the amount of damages laid in the declaration—the injury having been estimated by the plaintiff at eight hundred pounds in both instances. Here, then, we have the effects of what *some* would designate the "glorious uncertainty of the law." But the expression receives not our assent, because the difference furnished by the instances before us is surely attributable, *not* to "the uncertainty of the law," but to some essential variations in feeling and mind possessed by the gentlemen who sat as jurymen on the two causes.

Not having been present on the Tuesday, it is not in our power to speak, from personal observation, of the demeanour of the individuals who composed the jury on that day; but with respect to the gentlemen who officiated as jurymen on Monday, their names and addresses will be found in a brief notice of the trial in another column. Holding as they do such honourable stations in society, it would be impertinent were we to comment on their claims to respectability. We cannot, however, refrain from stating that these gentlemen paid the most scrupulous attention to the evidence, the arguments, and the summing up of the learned Judge, and that, whether drawing our inference from the pertinent questions proposed by them to the witnesses, or from the verdict of "*one farthing damages*," we believe there was not an individual in court who questioned either the purity of their intentions, or the soundness of their decision. And be it observed we make no exception here of the plaintiff, his attorney, or John Long, all of whom were present. Under such circumstances, who is to understand the grounds on which four hundred pounds were awarded against Dr. Ryan and his publishers? Those who approve of the verdict given on the Monday, will of course be strongly inclined to question the propriety of the Tuesday's award, because it cannot be forgotten, in estimating the amount of damages granted in the two cases, that the prosecuted article was *first* published in The Lancet, and copied from that work into the journal of which Dr. Ryan is editor, and Messrs. Renshaw and Rush—the other defendants—publishers. There is however this important distinction to be drawn between the two cases. The Editor of The Lancet did not offer to "*apologise*" to the plaintiff, and then go into court with a plea of *justification* upon the record. Here was a discrepancy in the conduct of Dr. Ryan, which his jury could not overlook without being utterly destitute of common sense. If an apology were called for, the offer of one was handsome, generous, and consistent; but surely it could not appear just to the upright minds of twelve impartial men to persist in an attempt to *justify* statements which, by the defendant's own admission, entitled the plaintiff to an apology. The jury, believing that Dr. Ryan would not have proposed to apologize without a conviction that he was in error in making the publication in question, were necessarily compelled to consider that a perseverance in the plea of justification was little short of an act of determined persecution. The defendant in this cause either *was*, or was *not*, warranted in his offer to apologize; if the former, his plea could not appear to the Court otherwise than an unjust one; if the latter, his proposal to apologize must have seemed to originate in a desire to screen himself from the consequences of an action for libel, rather than to render justice to the plaintiff, or to protect the public from injurious practices. Although, therefore, we are disposed to look upon the award of damages against Dr. Ryan, as

excessive in a marked degree, yet we must confess that he did not occupy before the Court that position which alone can be filled by an unflinching member of an upright, independent, medical press.

In founding a Hospital in connexion with the University of London, it is to be hoped that the Council will not be unmindful of one glaring omission, so strikingly apparent in all the great eleemosynary medical institutions of this metropolis—we allude to the invariable absence of a *stipendiary* resident medical officer, always at hand to afford, at once, assistance to the sick, and clinical information to the student. Will the public credit the statement that—with the exception of the Fever Hospital, where cases of surgery are not admitted—there is no such officer in this capital? There are resident chaplains, resident stewards, resident brewers, resident cooks, and resident nurses, but resident *surgeons* to afford *immediate* assistance to the wounded and bleeding victims of accidents, there are none! Of course we take not into this account the dispensing apothecaries—the mere tools of the physicians, nor the "House-Surgeons," as they are styled, who *purchase* their places by the year from the superior officers of the establishment. If the endowed hospitals were poor—if they were almost destitute of funds, there might be some apology for the governors when they omit to provide competent resident officers; but when it is recollected that the income of Guy's Hospital, arising from the hospital estates, amounts to *fifty-thousand a year*, and that the hospitals of St. Thomas's and Bartholomew's, respectively, command sums reaching about *forty thousand pounds* per annum, it is a scandalous, a wanton, a cruel neglect in the application of such princely resources, to omit securing for the suffering sick and inquiring students, medical and surgical skill commensurate with the wants of both. An interference with the claims of patronage cannot, however, be readily tolerated in these "*ancient* institutions," but in an establishment like the London University, which has been thrown into public view by the increased light of modern times, it is to be hoped that no sacrilegious influence will be permitted to prevail between the sick and their wants, and between the students and the prosecution of their intellectual pursuits. The Council must not forget that men who shine as professors in the lecture-room, are often utterly incompetent to discharge the duties devolving upon hospital practitioners. The professor's chair, therefore—merely as such—should not be recognised as the legitimate and certain stepping-stone to office in the establishment for the sick, for, should this precedent be admitted in the new institution, the Council will only add another to the large number of human slaughter-houses already existing in this metropolis.

Well instructed from a sad and painful experience in the calamities which have arisen from the system of nepotism, which has so long flourished in our hospitals, the members of the medical profession are actively alive to every projected improvement in hospital government. Accordingly we find, that the proposal of the Council to erect a medical establishment, for the avowed double purpose of affording medical aid to the sick poor, and information to the pupils in the department of medicine, has elicited the most vivid feelings of satisfaction. But before the Council exert themselves with the public in furtherance of raising the necessary funds, the public demand the *regulations* which shall govern the bestowal of the money. "This," they say, "is a condition precedent, which a well-disposed and respectable body cannot refuse to furnish," and they require "that the elections to all the offices of trust in the hospital shall be

influenced solely by the intellectual claims of the candidates, and that there shall be appointed a *resident*, properly-remunerated medical officer, competent to render immediate aid in all cases that may be admitted, whether medical or surgical." The subscribers, we apprehend, will resolve that it shall not be remarked of this institution,—as of St. Thomas', Guy's, and Bartholomew's Hospitals, that the physicians and surgeons appear to reside at the greatest possible distance from them, with apparently no other object in view than that of escaping from the discharge of duties, which humanity and science alike call upon them to fulfil. Deriving little or no emolument *directly* from the funds of these charities, the medical officers seem to consider their official obligations as of very slender tenure, and to regard the students as a species of game, which they have a right to pluck with an impunity not to be questioned.

The establishment of the proposed hospital furnishes the Council of the UNIVERSITY with a splendid opportunity for effecting in hospital government an efficient and noble reform. We call upon them, therefore, to reject every species of unworthy influence, to cast aside all sinister views, if any be entertained, and to come out at once frankly and boldly with a declaration that the hospital, when erected, shall be provided with a resident medical officer, and that that officer shall only be enabled to obtain his station by means of the unalloyed influence of his merits. The effect of such a pledge would act as a charm upon the tightened purse-strings of an intelligent community, and let loose a vast fund of wealth which may be applied for ages yet to come to the noblest purposes of humanity and science.

The Anatomy of the Thymus Gland. By Sir ASTLEY COOPER, Bart., F.R.S., &c., &c.

(*Concluded.*)

AFTER examining the structure of this curious organ in the lower animals, the Serjeant proceeds to its inspection in the human subject. He describes it as formed of a thoracic and cervical portion on each side, the former situated in the anterior mediastinum, and the latter in the neck just above the first bone of the sternum, and beneath the sterno-laryngeal muscles. Between two and three months of fœtal life, this gland is so small as to be scarcely perceptible. At three months its increase is in proportion to the magnitude of the fœtus, and thus it continues to the seventh month, when it enlarges out of proportion to its former growth. At eight months it is large, but at the ninth month it has undergone a sudden change, and become of a great size. It increases after birth, and continues large to the first year, when it slowly disappears, and the cavities cease to exist at the time of puberty. Sir Astley has seen two varieties in the relative position of this organ; the first was the vena innominata passing through the gland; and the second the same seen placed anteriorly to the cervical lobes. He never saw two glands precisely alike in form. Sometimes they are round, at other times of great length, and some are so thin that the serpentine arrangement of their lobes may be seen without dissection.

At birth the thymus gland reaches half way down the sternum, and thence extends into the neck as far nearly as the thyroid gland. It is connected to the sternum, and the origin of the sterno-laryngeal muscles, by cellular membrane. It adheres strongly by the same medium to the pericardium; before and beside it are the internal mammary arteries and veins.

Sir Astley Cooper thus describes the thoracic fascia:—

"This fascia is wanting immediately behind the upper bone of the sternum, and, leaving a space for the passage of the thymus gland, is attached to the edge of the first rib; one portion of it passes upwards and unites itself to the coats of the jugular veins, to the surface of the trachea, and joins the deep-seated fascia of the neck described by Burns.

"The thoracic portion descends upon and

surrounds the arteria innominata, left carotid, and left subclavian arteries, and extends itself on the coats of the aorta, covering, enveloping, and supporting each of the vessels, and inseparably connecting them with the bones which form the opening of the thorax. A slighter union also subsists between the fascia, the surface of the vena innominata, and the pericardium.

"This fascia is united to the edge of the first rib as far as its head, and is not only joined to the curvature of the aorta and its vessels, but also descends upon the trachea as far as the division into the bronchi.

"Of all the parts that enter the chest, the œsophagus is the least confined by this structure; as that tube requires that its capacity should frequently change in the act of deglutition, it was necessary that it should be but loosely connected to the surrounding parts to admit of the necessary changes in its diameter. To allow of this, the fascia forms a crescent from the first rib on each side to the spine, leaving a large space before the vertebræ for the passage of the œsophagus. In other parts the upper opening of the thorax is shut by the fascia, being united to the nerves, arteries, veins, and trachea."

The thymus gland is formed of two distinct bodies, which may be properly called a right and left thymus gland. This organ is connected to the adjacent parts by an envelop of coarse cellular tissue which not only fixes it in its situation, but also unites the two glands of which it is composed, so as to require a delicate dissection to separate them.

"When this membranous covering is removed, the substance of the gland is exposed, which is found to be of the conglomerate kind, being formed of numerous lobes which are connected together by a second covering of reticular tissue uniting the lobes to each other, and combining its parts by entering minutely into its interstices.

"The lobes of this gland differ in magnitude, but not one of them appears to be larger than a pea, and they vary from that of the head of a pin to the size abovementioned. When the form of the thymus is strictly investigated, the lobes are found to be disposed in a serpentine direction around a cavity hereafter to be described.

"The gland may be unravelled, and it will be found to be composed of a rope on each side of which the right and left thymus is constituted, and on each of these the large lobes form knots, and it appears like a necklace of beads, but even these lobes may be farther separated. In order to succeed in unravelling the gland, it is necessary to divide the arteries, veins, as well as mucous membrane, because the arteries, veins, and membrane, unite the lobes to each other.

"These ropes are disposed on a spiral course around the central, or nearly central, cavity, and this disposition of them is preserved by the arteries, veins, and mucous membrane, by the division of which the ropes are unravelled.

"The spiral rope which constitutes the gland on the right side has no communication with that on the left, although the two glands are combined into one by cellular tissue, yet in its usual formation, the glandular structure continues entirely separate. This rope or chain is composed of lobes of different sizes, connected together by membrane, and by smaller portions of gland which surround a large internal cavity. To proceed with the investigation, remove a very thin superficial slice of each lobe, or of several of these, and numerous little cavities will be seen, which may be set open after the organ has been hardened in spirits of wine, and these are the secretory cells producing the fluid which issues so abundantly. The lobes being farther examined, beside their cells, are found to contain a small pouch at their bases which leads into a reservoir, so that the secretion which escapes finds a ready entrance into the cavity of the gland from which it may be absorbed.

"If a pipe be introduced into the gland, and alcohol be injected, and the organ immersed in strong spirits, or a solution of alum, a large cavity will be filled, which I shall call the reservoir of the thymus. This forms a general communication between the different lobes; it begins from the inferior part of the thoracic portion, and thence extends into the extremity of the cervical. The reservoir does not maintain a straight course, but passes in a serpentine direction through the thoracic part of the gland, and is somewhat more direct in the cervical portion. With regard to its size, it varies in different places, but generally is the largest near the centre of the thoracic, and it is least at the communication of the cervical with the thoracic part of the gland. In the cervical portion it increases, but is less than in the thoracic. When opened after being injected and hardened, its internal surface appears to be lined by a smooth membrane; but if it be at once dissected in water, this lining membrane is found to be of the mucous kind, for it is rather villous than smooth, and instead of having a few red vessels, when filled with a vermilion injection, it is found to be highly vascular, and the arteries which are distributed to it may be seen meandering

upon its surface, and minutely dividing so as to redden every part of it.

"Its interior forms ridges, which are produced by small ligamentous bands which cross the surface of the reservoir in various directions, and encircles the mouths of the pouches; these bands are formed for the purpose of keeping the lobes together, of preventing an injurious yielding of the parietes of the cavity, and to give strength to resist too great an accumulation of the secretion. When the reservoir is floated in water, a number of small openings appear upon its internal surface; and if a probe be introduced into these, it passes into the pouch at the root of the lobes, so that by these apertures the secreted fluid escapes into the reservoir. These orifices are not so numerous as the tubes themselves, the reason for which is, that each point communicates with more than one lobe.

"The boundaries or walls of the gland are full of secretory cells which are minute; they communicate with one another and open into the pouch of the lobes, and from the pouch into the reservoir."

Sir Astley describes the best mode of dissecting and preparing this organ, to be the injecting of the superior cava with one coloured fluid, and the aorta with another, by which means the blood-vessels of the thymus are filled; then to remove it from its connexions, and dissect off its envelope of coarse membrane. Its lobes being now distinctly visible, an injecting pipe is to be passed into the interior of the gland, and the reservoir filled with alcohol, when not only it, but many of the secretory cavities besides, will be distended. It is then to be put for two days into spirits of wine or alum solution, and it will become hardened. The anterior surface nearly to the middle of the gland being cut off, and through the thoracic and cervical portions, an excellent view is thus produced of all the parts of the thymus. Coloured gelatine, quicksilver, and coloured wax, have all been employed for the purpose of injection. We may sum up the anatomical facts ascertained, thus briefly:—1. It is composed of a gland on each side united by cellular tissue.—2. It is formed of two cords, which when unravelled are of considerable length.—3. These ropes are constituted of large and small lobes.—4. They are disposed in a spiral or serpentine course.—5. Each portion of the rope is a secretory structure.—6. The lobes contain secretory cavities or cells.—7. A pouch of communication exists between the lobes and the reservoir.—8. The gland has a central cavity or reservoir.—9. This cavity is serpentine.—10. The reservoir is lined by a very vascular mucous membrane.—11. The ropes of the gland pass in a spiral direction around the mucous membrane which lines and forms the reservoir, and these ropes, by uniting that membrane to each other, assist in forming the cavity.

The arteries of the thymus gland are derived from the internal mammary, and superior and inferior thyroideal arteries. Its veins have a different course, for although the internal mammary and thyroideal veins receive small branches from this gland, yet the principal veins are those which end in the *vena innominata*.

Sir Astley has only once been able to inject in the human subject the absorbent vessels proceeding from an absorbent gland of the thymus. Absorbent glands are found at the upper part of the sternum in the mediastinum; also a small gland between the thoracic portions, and some at the junction of the thymus with the jugular and subclavian veins, where the principal trunks of the absorbent vessels at all periods of life terminate.

The nerves of this organ are very minute, they are derived from filaments from the par vagum, sympathetic, and phrenic nerves, and assume a plexiform arrangement.

In speaking of the physiology of the gland, the author thus proceeds:—

"That an important function must be performed by an organ so uniformly found, of a size so large, of a highly vascular structure, and secreting abundantly, no one who duly considers the subject, can for a moment hesitate to acknowledge; and for myself I cannot subscribe to the opinion of those who think this gland is designed merely to fill a space which the lungs in their expanded state after the birth of the fœtus may be destined to occupy in respiration.

"If this had been the case, it would not have been a secretory organ, nor do I believe that nature in her wisdom creates any part of the body upon such views or principles.

"I cannot agree with the opinion that the structure of the thymus and absorbent glands is similar; one is conglobate and the other conglomerate; one is firm and compact, and the other is loose and pulpy;

the one contains cells of considerable magnitude when in a distended state, whilst in the absorbent glands the cavities are small, and with so much difficulty traced that there is still a doubt if they be cellular or vascular.

"The office which the thymus gland is designed to perform is evidently connected with the fœtal stages of existence, as it gradually lessens soon after the child is born, and even when the gland remains of considerable bulk, its secretory cavities are much diminished.

"It has been already stated, that this gland secretes a great abundance of white fluid; that it is situated between the veins in which the great absorbent ducts of the body terminate; that to each cornu is attached a large absorbent duct in the fœtal calf, capable of being filled with coarse injection, and that this vessel terminates at the junction of the jugular veins in the near innominata. This fluid, though constantly found in the human fœtus, having the appearance of chyle, viz. white like cream, but with a small admixture of red globules, is not easily procured in sufficient quantity to make it the subject of chemical analysis; but from fœtal calves two or three ounces may be without difficulty collected, and an abundant opportunity afforded of ascertaining its composition.

"The fluid thus collected from the calf has the appearance of cream slightly tinged with blood. *Warm water* dissolves a portion of it. *Heat* and *alcohol* coagulate it. *Sulphuric acid* not only coagulates but chars it. *Nitric acid* coagulates it firmly, first turning it white and then yellow. *Nitric acid diluted* precipitates a white solid from its solution in water, giving it the appearance of milk. *Muriatic acid* coagulates it firmly, and turns it white. *Liquor potassæ* converts it into a muco-albuminous matter, which falls in long-extended threads, like the saliva in ranula."

This fluid was sent by the author to Dawler, of Richmond, to be analysed. The result of that gentleman's analysis was this:—100 parts of fluid were found to contain 16 of solid matter; incipient fibrin; albumen; mucous and muco-extractive matter; salts, consisting chiefly of muriate and phosphate of potash, and phosphate of soda; of phosphoric acid a trace.

"It was ascertained, that the presence of the very minute quantity of free acid destroyed the affinity of the fibrinous particles for each other, for as soon as the acid was either saturated with an alkali, or further diluted with water, they then adhered together. A portion of the fluid on being dropped into two or three times its weight of water, and gently stirred about, will unite with a part of it, and after a short time be converted into a gelatinous-looking mass. This mass consists of a solid and of a fluid part, and which may be separated from each other by mechanical means.

"If the fluid from the thymus gland be examined in a microscope, it is found to contain an immense number of white particles, and a very small quantity of this fluid in serum exhibits those particles in the most satisfactory manner. It appears by the analysis that this gland secretes all the component parts of the blood, viz. albumen, fibrin and particles, excepting that the particles, like those of chyle, are white instead of being red. As to the muco-extractive matter in the fluid, it is probably derived from the mucous membrane, which lines the reservoir, and secretory cavities, of the gland.

It appears to be an error, that this gland continues for some time after birth to perform the same office as that which it supported in the fœtal state:—"I injected the gland in a child of one month, and I found that the lobes had become quite thinned by absorption, although the reservoirs in part remained, but even one of these was partially obliterated. In a child of four months the reservoir was very small, broken into several portions, and the weight of the gland, which should have been in the fœtus of nine months 240 grains, weighed only 45. In a calf of four months, the gland is very large, yet the cells and reservoirs will not receive one-half of the injection, which will enter in the fœtus of nine months.

"I will, therefore, put the following query:—As the thymus secretes all the parts of the blood, viz. albumen, fibrin, and particles, is it not probable that the gland is designed to prepare a fluid well fitted for the fœtal growth and nourishment from the blood of the mother before the birth of the fœtus, and consequently before chyle is formed from food, and the process continues for a short time after birth, the quantity of fluid secreted from the thymus gradually declining as that of chylification becomes perfectly established?"

The author concludes his interesting pamphlet by a chapter on diseases of the gland, and states that during 40 years practice he had met with but one example, that of a young lady 19 years of age, who suffered under a severe dyspnœa, and could scarcely remain recumbent for a few minutes. A swelling occupied the inferior part of the neck, at the upper opening of the thorax,

and projected above the clavicle upon each side. The swelling had existed for many years, but of late had suddenly increased. Antiphlogistic and soothing measures were resorted to, with only slight and transient relief; she grew daily weaker, her legs became œdematous, and she could not sleep but in the sitting posture, and then with her head inclined forwards; for the moment the head fell back, the pressure of the tumour on the trachea made the dyspnœa intolerable. She ultimately died, worn out by irritation. On examination of the body, the disease was discovered in the thymus gland, which appeared of a yellowish-white colour, and was divided into several large lobes, the reticular texture of the gland was found filled by a white pulpy substance. The disease appeared to be of the fungoid kind.

The plates by Child are excellent, and the work altogether is equally worthy the attention of the student of nature, and the regular book-worm.

BOTANIC GARDEN, CHELSEA.

Wednesday, 13th June, 1832.

One of the Messieurs Lowe Wheeler gives demonstrations of botany here every Wednesday. He is evidently endowed with a portion of good sense, and is upon the whole a fair lecturer. In the imagination of many people, however, this family is intimately associated with ideas of rainy weather, owing, perhaps, to the peculiarly gloomy and pluvious physiognomies which distinguish them. This is against the Lowe Wheeler before us, who has the character so strongly marked that if it be true that Medusa's head was a general solidifier, Mr. Wheeler's is nothing less than the universal solvent. As a lecturer, however, the owner has some good qualities,—a clear head, a good mode of expression, and some elocution. He is worth a host of such grandiloquent pedants as Gilbert Burnett and some others of that kind. He indulges, however, too much in digression upon topics only remotely relevant to his subject, such indeed as the young student cannot fully apprehend or remember.

He follows in his course the plan adopted in the elementary work of Sir James Smith, treating, first, of the physiology of plants; secondly, of their forms and classification; and, thirdly, of their economic and medicinal applications. There is some reason to question the excellence of this arrangement, even in an introductory book. For if, in imparting knowledge, it be wise to pursue the same track as in seeking it, it is obvious that the external forms and mutual resemblance, or contrast, of vegetable bodies, would first impress the imagination, and precede any inquiry into the more occult points of growth—of culinary or medicinal virtues. But in a course of what are professedly called "demonstrations," to make long-winded orations on physiological and vegeto-chemical phenomena at the commencement, is injudicious. How can a dissertation on the gravitation and centrifugal force of the planets, or on the ligature of the aorta in the human subject, be with propriety intruded into a demonstration of the roots of plants. If Mr. Wheeler wishes to display his reading, he ought not to do it at the expense of the student's time. The object of the course should be, to bring frequently before the pupil's eyes those botanical facts which he cannot learn elsewhere, under a methodical arrangement which will materially strengthen his remembrance of them.

The majority of students whom we meet with in this garden appear to conduct themselves in a very gentlemanly manner. A few of them, however, are complained of. Before the demonstration this morning, old Flora Macdonald, the muster of the Company, spoke of the injuries inflicted on the plants by the heedless portion of the students, and stated that several rare and delicate specimens had, by these means, been completely lost. A valuable plant maimed in this way, was exhibited; the terminal appeared to have been cropped off. It is extremely vexatious to see such injuries inflicted on valuable plants; but it is possible that the mischief on the present occasion was accidental, and though deserving reproof, yet not meriting the term "depredation," the appellation bestowed on it probably in ignorance of its meaning by the guardian in question.

We shall occasionally refer to the botanical transactions in this garden.

CORRESPONDENTS, &c.

Several Correspondents shall receive private answers in the course of next week.

We are sure our Correspondent *Mr. D.* will excuse our non-insertion of his reply to the remarks which appeared in the obscure print that has attacked him. If worthy of his notice at all, the answer should appear in the journal which contained the remarks.